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THE ROLE OF CHINA IN WORLD FISHERIES

STUDY

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EUROPEAN PARLIAMENT

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

FISHERIES

THE ROLE OF CHINA IN WORLD FISHERIES

STUDY

This document was requested by the European Parliament's Committee on Committee on Fisheries.

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DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

FISHERIES

THE ROLE OF CHINA IN WORLD FISHERIES

STUDY

Abstract:
This document aims to provide a broad perspective of China's fishing and related activities, and to support a better understanding of the role of China in world fisheries. The scope of the study is focused on China's marine capture fisheries, and covers the following subjects: the scale of Chinese catches, the state of the Chinese fleet, the role of China as an import/export country of fish products, the activities of Chinese fishing vessels on the high seas and in third country waters, and China and IUU fishing.

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List of Abbreviations

ASP	Amnesic shellfish poisoning
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCICED	China Council for International Cooperation on Environment and Development
CCSBT	Conservation of Southern Bluefin Tuna
CIQ	Inspection and Quarantine Bureau
CNFC	China National Fleet Corporation
CNY	Chinese Yuan
DSP	Diarrhetic shellfish poisoning
DWF	Distant water fishing
EEZ	Exclusive Economic Zone
EU	European Union
EUR	Euro
FAO	Food and Agriculture Organisation of the United Nations
FVO	Food and Veterinary Office
GAQSIC	General Administration of Quality Supervision, Inspection and Quarantine
GDP	Gross Domestic Product
GRFV	Global record of fishing vessels
GRT	Gross register tonnage
HSC	Harmonised System codes
HSVAR	High Seas Fishing Vessel Authorisation Record
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
IUU	Illegal, unreported or unregulated

LDRAC	Long Distance Regional Advisory Council
LNG	Liquefied natural gas
LOA	Length Overall
OECD	Organisation for Economic Co-operation and Development
OPAGAC	Organización de Productores Asociados de Grandes Atuneros Congeladores (Spanish association of purse seine fishing companies)
PRC	People's Republic of China
OPRT	Organisation for the Promotion of Responsible Tuna Fisheries
PSP	Paralytic shellfish poisoning
RASSF	Rapid Alert System for Food and Feed
RFMO	Regional Fisheries Management Organisation
RFV	Register of Fishing Vessels
RMB	Renminbi
SAR	Special Administrative Regions
SME	Small and Medium Enterprise
SPS	Safety and Sanitary and Phytosanitary
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
USA	United States of America
USD	United States Dollar
UVI	Unique vessel identifier
VLCC	Very large crude carriers
WCO	World Customs Organisation
WCPFC	Western and Central Pacific Fisheries Commission
WWF	World Wildlife Fund

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Executive Summary

China, the world's largest producer of fish, is experiencing a dramatic growth in per capita fish consumption and is also the global leader in fish export. Understanding the development of Chinese fish production, consumption and trade is thus of global relevance for understanding the future of wild fish stocks, marine ecosystems and consequent food security challenges.

This report is presented to the European Parliament (EP) with the overall objective to '*provide the European Parliament with a broad perspective of China's fishing and related activities, and to support better understanding of the role of China in world fisheries*'.

The study focuses on marine capture fisheries (excluding aquaculture and inland fisheries) and the geographical focus is on mainland China (Hong Kong, Macau, and Taiwan are excluded).

The main areas of review include: catches, IUU fishing, fishing fleet, imports, exports, and fishing activities outside Chinese waters.

The estimation of the annual **catch** of the distant-water fleets (DWF) of the People's Republic of China (PRC or China for the purpose of this report) is based on a specifically assembled, large international database of reported occurrence of Chinese vessels in various parts of the world, and related information.

Our main result is that China, which was previously known to over-report its domestic marine catch, massively under-reports (to the Food and Agriculture Organisation of the United Nations (FAO) the catch of its distant-waters fleets. This catch, estimated at 4.6 million tonnes per year (± 687,000 tonnes/year) globally for the 12 year period from 2000 to 2011 (compared to an average of 368,000 tonnes/year reported by China to FAO), corresponds to an ex-vessel landed value of 8.93 billion €/year (± 1.53 billion €/year).

Africa is the region where Chinese distant water fleets extract the largest catch, about 3.1 million t/year (± 690,000 t), followed by Asia (slightly over 1.0 million t/year ± 241,000 t), Oceania (198,000 t/year ± 31,000 t), Central & South America (182,000 t/year ± 53,000 t) and Antarctica (48,000 t/year ± 26,000 t).

The uncertainty of these catch estimates is relatively high, an expected feature of our results, given the constraints inherent in the underlying data and method used. However, a first-order estimate of potential illegal, unreported or unregulated (**IUU**) catches around the Africa region shows that around 2.5 million tonnes per year, of the estimated Chinese distant water catch of about 3.1 million tonnes per year in the African region, may be unreported. Similarly, the disposition of the catch remains unclear, though there is evidence that some of it ends up on international markets, notably in the European Union (EU).

With regard to **fishing fleet**, China reported to the FAO, in 2007, a total of 289,000 motorised fishing vessels active in marine fisheries with a total combined power of 14.7 million kW. However, fleet estimates appear to be uncertain, particularly in relation to smaller scale coastal vessels.

Trawl fisheries dominate, accounting for almost half of domestic production, in the three management areas under Chinese jurisdiction: East China Sea, Yellow and Bohai Sea, and South China Sea.

The excess of fishing capacity is the major impediment to the effective management of marine resources in China, generally suffering from over-exploitation. However, the strategies to reduce fleet capacity have had limited success so far in a highly-decentralised system where the registration of fishing vessels is handled by regional offices.

The development of the distant-water fleet is recent, starting in 1985, but has now expanded to 1,900 DWF vessels in 2010. During the period from 2000 to 2010 there was an average of 1,800 vessels operating in distant waters. The distant-water sector appears to depend heavily on subsidies to survive, and despite having evolved from being entirely state-owned to being 70% privately owned, it is the stated goal of the Government to modernise and expand (and restructure) the sector. A third of the industry is composed of a large Chinese state-owned enterprise, Chinese National Fisheries Corporation, and its subsidiaries.

As it is with many other commodities, China is a major **trading** nation in fishery products with net exports of fishery products worth US$13.2 billion (3.2 million tonnes) and imports of €4.5 billion (2.5 million tonnes) in 2010. Furthermore, China has an increasing net positive balance of trade, rising from US$3.2 billion in 1996 to US$8.7 billion in 2010 (€1.8 to €6.6 billion) reflecting a disproportionate growth in exports supplied by increased national production (mainly aquaculture).

China is the fourth-largest **importer**, after the EU with imports of US$21.6 billion (€15.5 billion) in 2009, Japan with US$14.9 billion (€10 billion) in 2008, and USA with US$14.1 billion (€9.5 billion) in 2008. Of all of the top 10 importing countries China has the highest rate of growth of imports (of 18%) driven by increasing demand from the internal domestic market as well as demand of raw materials to satisfy export demand.

The main type of fishery product imported is whole frozen fish (74% of all imports, about 2 million tonnes /year) which supplies national consumption as well as processing of whitefish fillets for re-export.

Russia and the USA are the main source of imports reflecting the importance of Pacific whitefish trade (averaging US$1.7 billion 2005 to 2010), accounting for 35% of imports. Other important suppliers include the EU, Norway and Japan. China imported just €213 million from the EU; important products for consumption were Greenland halibut and mackerel; some cod and shrimp are imported for re-processing.

The importance of China as an **exporter** of fish and fishery products is unquestionable: with an annual growth of 14%, China has become the world's largest exporter of fishery products, with exports of US$13.2 billion in 2010, followed by Norway and the EU. China contributes about 10% by weight and 13% by value of global trade in fishery products; this accounts for about 1% of China's visible exports. China's export growth is underpinned by increased sources of supply from US and Russian pacific whitefish fleets, and increased domestic aquaculture production.

The main destination markets for Chinese export of fish products are Japan, USA, the EU and South Korea. Sales to non-Asian markets (including the US and EU markets) have doubled in 6 years, partially due to penetration in non-traditional developed markets. And,

about one fifth of China's fishery product exports are whitefish fillets (mostly Alaska Pollack and Pacific cod) worth US$2.7 billion (€2 billion) in 2010.

The EU imported €1.5 billion of fishery products from China in 2010, about 6% of all fish consumed. However, China contributed some 54% of Alaska Pollack, and 25% of all whitefish fillets, products used extensively by EU secondary processors. The main EU markets for Chinese fishery products are Germany, Spain, UK and Netherlands, importing a wider range of fishery products. On average, fish fillets accounted for the majority of the imports (about 64%), and crustacean and molluscs for another 20%.

The rise of China as an industrial and manufacturing platform is reflected in the rapid development of the fish processing sector. There is a significant cost and quality advantage to hand filleting in China. Compared to mechanical processing, filleting by hand delivers both a superior yield and a better quality of product.

According to DG SANCO, in August 2011 there were 718 processing establishments, freezer vessels and factory vessels, approved by the Competent Authority for export to the EU. These included 542 processing factories (of which 294 were authorised for processing of capture products only). The great majority of these factories (90%) are located in just five coastal provinces; two of which, Shandong Province (main city Qing Dao) and Liaoning Province (main city Dalian), account for 52% of processing establishments.

In relation to the **evolution** of the Chinese **market**, China is an important consumer of fishery products in its own right. In fact, China contributes about one fifth of the world population and its consumption accounts for about a quarter of global demand for fish. Fish consumption has more than doubled over the last 20 years to around 27 to 32 kg/capita/year, but per capita consumption appears to have reached a limit. In this respect, about 40% of consumption is from aquaculture and much of the growth in consumption is attributed to increased supplies from aquaculture, including carp.

Overall, future growth in fish consumption in China is likely to be modest and driven by growth in population rather than per capita consumption; it is likely to be mainly supplied from aquaculture, and is not likely to impact strongly on those EU supply chains which depend on China as a source (e.g. for whitefish fillets).

Rapid industrialisation of China's agricultural and food industry appears to have outpaced the development of the food safety control system, and regular food safety scandals have plagued the Chinese food industry in recent years, undermining confidence in the sector and government's control institutions.

The fishery sector is not immune to **food safety risks**; during 2006 to 2011, EU Member States and the Commission issued 335 Rapid Alert notices with regard to Chinese fishery products which did not comply with EU food safety standards. About half were in relation to use of illegal chemicals in aquaculture and additives in processing. However recent findings from missions of DG SANCO Food and Veterinary Office show significant improvements in the control system for veterinary medicines.

With regard to the activity **outside** Chinese **waters**, it is worth noting that China has significantly improved its cooperation track record in recent years, particularly within the Regional Fisheries Management Organisations (RFMOs) (e.g. higher level of cooperation with EU initiatives), a situation mainly driven by China's commercial interest, according to several stakeholders. In fact, China is member of all the tuna RFMOs. However, China presents slower progress in the adoption of international agreements, the main challenges

being China's frequent opposition to any changes on IUU rules, and the difficulty to understand China's actual position regarding some agreements (e.g. Port State Measures). The nature of China's fisheries agreements varies from state-to-state bilateral agreements to non-governmental arrangements between parastatal / public-private partnerships and third countries. In any case, China's fisheries agreements are characterised by lack of transparency and, quite often, controversial content.

China's presence in West Africa and South America is raising growing concern about the impact in the local economy and in the environment of the host country. IUU activities are probably the main cause for concern, with the agreement-dependency of the host country making it very difficult to fight against IUU practices (agreements are usually linked to loans and aid projects).

Finally it is worth noting EU stakeholders' concerns over China's approach to secure fishery agreements, essentially based on offering the third party whatever is demanded to secure their supply. Stakeholders believe this is resulting in tougher negotiations of fisheries agreements for the EU, particularly in Western Africa.

Exchange Rates Used

Year	EUR	US$	CNY
1996	1	1.2750	10.6014
1997	1	1.1431	9.4771
1998	1	1.1152	9.2331
1999	1	1.0715	8.8695
2000	1	0.9274	7.6775
2001	1	0.8965	7.4202
2002	1	0.9359	7.7052
2003	1	1.1179	9.2675
2004	1	1.2349	10.2330
2005	1	1.2538	10.2895
2006	1	1.2476	9.9552
2007	1	1.3654	10.4065
2008	1	1.4828	10.3302
2009	1	1.3920	9.5156
2010	1	1.3294	9.0145
2011	1	1.4009	9.0718

Source: http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/inforeuro_en.cfm

1 INTRODUCTION

1.1 Study objective

This study is intended to provide the European Parliament with a broad perspective of China's fishing and related activities, and to support better understanding of the role of China in world fisheries.

The study focuses on marine capture fisheries (excluding aquaculture and inland fisheries). Moreover, the geographical focus is on mainland China (Hong Kong, Macau, and Taiwan are excluded), which is in line with the standard approach to research on fisheries in China, since Hong Kong, Macau and Taiwan generally maintain separate systems of governance, regulations and trade statistics (Clarke, 2009).

The study was developed on the basis of desk research and stakeholder consultations. The Chinese Authorities were approached during the inception phase to discuss a possible mission to China for field work. However, due to lack of confirmation/feedback from the Chinese Authorities, this mission has not been conducted.

- **Desk Research**: a thorough review of all available information regarding China's fisheries (e.g. key published documents/reports, Government data, industry information, etc.), aimed to develop a better understanding of the six thematic areas (catches, fleet, imports, exports, fishing activities outside Chinese waters and IUU), and to identify gaps and/or issues. The complete list of references is provided at the end of the study;
- **Stakeholder consultations**: from December 2011 to March 2012 the contractor contacted relevant stakeholders, including the EC, the EP, fisheries industry, NGOs, and other stakeholders. The list of stakeholders consulted is included in Annex II.

1.2 Overview of China's fisheries[1]

The People's Republic of China (herein referred as PRC or 'China', and excluding Taiwan) is located in Eastern Asia, bordering the East China Sea, Bohai Sea, Yellow Sea, and South China Sea. China has an estimated population of some 1.3 billion people and is the world's fourth largest, after Russia, Canada, and the US, with a total area of 9,596,960 km^2 and a continental coastline of 18,000 km length (FAO country fisheries profile).[2]

The Exclusive Economic Zone (EEZ) of China is subject of an ongoing dispute with its neighbour countries (i.e. Japan, South Korea, Taiwan and countries bordering the South China Sea). The *Sea Around Us* project reports the EEZ of China as 2,285,872 km^2 and a shelf area 1,013,154 km^2.[3]

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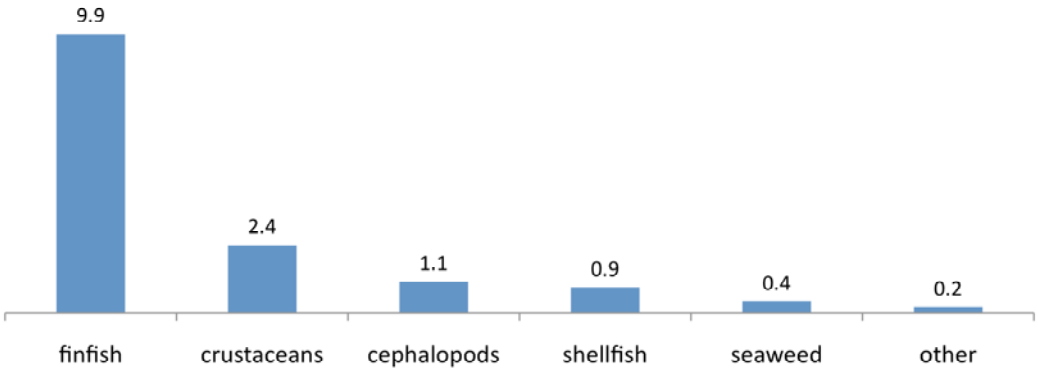
[1] Most of the facts and figures presented in this section are based on FAO (2010) and FAO country fishery profile, with the exception of some data, whose source is explicitly noted.

[2] At 1 November 2010 (National Bureau of Statistics of China).

[3] The Sea Around Us project explains that "The United Nations Convention on the Law of the Sea (UNCLOS), initiated in the 1960s, established a framework that permitted countries to define their claims over the ocean areas, and provided agreed upon definitions for territorial seas (now defined as 12 nm), contiguous zones (24 nm, for prevention of infringements of customs, fiscal, immigration and sanitary regulations) as well as 200 nm Exclusive Economic Zones (EEZ), which now cover most shelf areas down to the continental shelf margins at which the slope of the continental shelf merges with the deep ocean seafloor. Most countries declared EEZs right after the adoption of UNCLOS as international law in 1982. Within its EEZ, the country has the sovereign right to explore and exploit, conserve and manage living and non-living resources in the water column and on the seafloor, as defined by Part V of the Law of the Sea" (www.seaaroundus.org/doc/saup_manual.htm#15).

The FAO country fisheries profile reports more than **3,000 species of marine life** found along the coast, of which over 100 species are targeted in China. In 2004, the main harvested products were divided into six groups: finfish (9.88 million tonne); crustaceans (2.4 million tonne); cephalopods (1.14 million tonne); shellfish (850,000 tonne); seaweed (376,000 tonne); and other (205,000 tonne, including jellyfish) (Figure 1.1).

Figure 1.1: Main groups of species in China (2004) (million tonnes)



Source: FAO (2010)

Administratively, China is divided into 31 provinces, autonomous regions and centrally administered municipalities (Figure 1.2), of which eleven are coastal and fall under the following **three management areas**:

- Bohai and the Yellow Sea: Liaoning, Hebei, and Shandong Provinces and Tianjin city. The Yellow Sea (some 380,000 km^2) and the Bohai Sea (some 77,000 km^2) are semi-enclosed seas located in the temperate zone. They provide good spawning and feeding grounds as well as migration pathways for many aquatic organisms;
- East China Sea: Jiangsu, Zhejiang and Fujian Provinces, and Shanghai city. The East China Sea (some 770,000 km^2) has always been a main fishing area in China, and the Zhoushan fishing ground is the largest near-shore fishing ground in China. Historically this area teems with the four major - species: large yellow croaker, little yellow croaker, largehead hairtail and cuttlefish (sometimes known as the 'famous four'). In recent years, because of bilateral fishery agreements with Japan and Korea, the effective size of the fishing ground accessible to Chinese fishermen has been reduced, as has the catch;
- South China Sea: Guangdong and Hainan Provinces, and Guangxi municipality. The South China Sea is situated in the tropical and sub-tropical zones. It has a vast water area (some 3,500,000 km^2) and contains a variety of aquatic species, yet fishing grounds are rather scattered.

The **fisheries industry** is an important element of the agriculture sector in China. In 2004, the fisheries sector represented 10.5% of the agricultural GDP in China, while the total GDP of fisheries was US$ 45.9 billion, an increase of 0.2% from 1999. Nearly 21 million people in China relied on the fisheries sector in 2004, an industry that employed 13 million people (8 million full-time) mainly engaged in the primary sector (7.1 million workers). Most of the workers in the primary sector were related to aquaculture (4.5 million) followed by capture fisheries (1.8 million) (FAO country fisheries profile).

Figure 1.2: Map of China, showing its 31 provinces, autonomous regions and centrally administered municipalities.

Source: http://www.paulnoll.com/China/Provinces/index.html

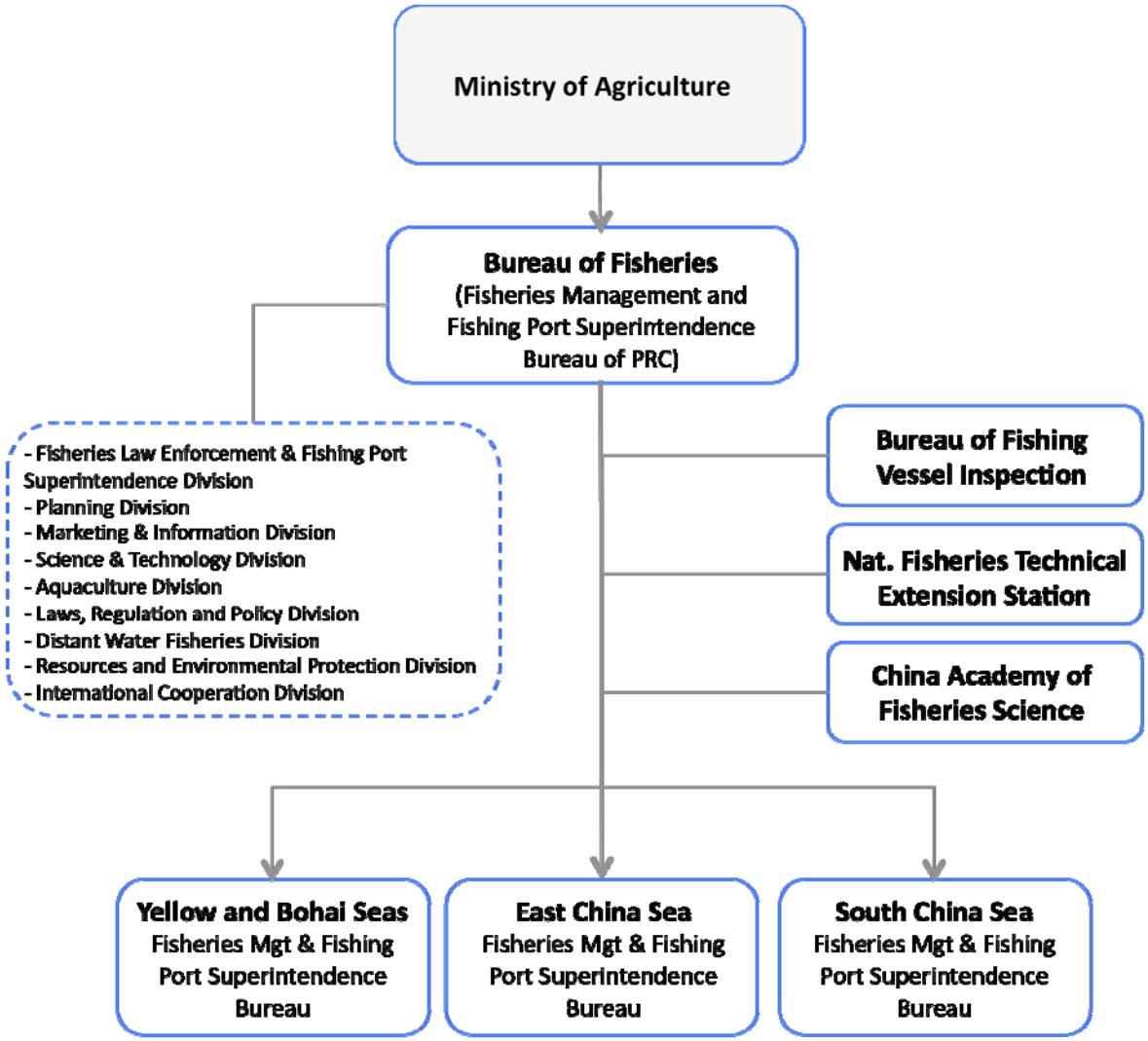
FAO (2010) also provides estimates on the importance of traditional (presumed to be small-scale) fisheries in China: there were an estimated 4,060 marine fishery villages in 2004 and 3.3 million traditional fishermen in China's marine fisheries. Fishery villages were mainly concentrated in Shandong (946), Guangdong (896), Zhejiang (654), Fujian (522), Liaoning (410) and Hainan (290). Fujian province has the greatest number in terms of traditional fishermen (900,000), followed by Guangdong (660,000), Shandong (580,000), Zhejiang (380,000), Hainan (280,000) and Liaoning (180,000).

The **fisheries administration** in China falls under the responsibility of the Ministry of Agriculture through the support of several bodies at national level, as well as regional, provincial or municipal local fisheries authorities (Figure 1.3).

The Bureau of Fisheries of the Ministry of Agriculture is the highest fisheries authority, in charge of the enforcement of fisheries laws and managing and coordinating fishing related activities nationwide. It counts on the support of the three regional management authorities (Yellow Sea and Bohai Bay, East China Sea, South China Sea) for the implementation of fisheries law and regulation at regional level.[4] The Bureau of Fishing Vessel Inspection (also known as the state fishing vessel inspection agency, see section 3.4) exercises the function of fishing vessel inspection and of the supervision and administration thereof. There are fisheries law enforcement agencies or fisheries management commissions, as well as environment monitoring stations in major ports and inland water areas of the country.

[4] The Bureau of Fisheries of the Ministry of Agriculture is also called the Fisheries Management and Fishing Port Superintendence Bureau of PRC.

Figure 1.3: Organisational structure of fisheries management institutions at national level in China



Source: FAO country fisheries profile

In China, education and research in the area of fisheries, as well as extension efforts are dominated by the public sector (Pemsl *et al.*, 2008). The National Fisheries Technical Extension Station was established in 1991 in order to promote fishery development through the introduction of advanced technologies and scientific research to the fishermen by means of training, conferences, on the spot demos, etc. There are Extension Agencies throughout the whole country: in 2004, there were 13,514 fisheries technical extension services, 10,000 more than in 1999. The China Academy of Fisheries Science controls the Fisheries Research Institutes of the three regional seas management authorities (Yellow and Bohai Seas, East China Sea, and South China Sea) as well as some others.[5] Moreover, every region or city under the jurisdiction of the central government has its own fisheries research institute.[6]

[5] The complete list includes: Yellow Sea Fisheries Research Institute; East China Sea Fisheries Research Institute; South China Sea Fisheries Research Institute; Fisheries Research Institute of Heilongjiang River; Yangtze River Fisheries Research Institute; Pearl River Fisheries Research Institute; Freshwater Fisheries Research Centre; Fisheries Machine Research Institute; and Fisheries Engineering Research Institute.

[6] In 2004, fisheries research institute projects included: research on fine variety and seed of Yangtze River reproduction technology; anti-typhoon deepwater cage integrated faming technology demonstration; establishment of healthy aquaculture safety management system; research on key technology of famous fish

Further to the above, other relevant institutions related to fisheries include the State Oceanic Administration, National Environmental Protection Agency, Ministry of Water Resources, China Fisheries Society, China Fisheries Association, China Fishing Vessel Owners Insurance Association, China Fisheries Products Marketing and Processing Association.[7]

There has been growing concern over the last decades with regard to the **environmental challenges** affecting fisheries in China. FAO (2010) mentions that the Government of China, acknowledging the situation, issued in 2006 the *Programme of Action on Conservation of Living Aquatic Resources of China* to *"reverse the trend of deterioration of the aquatic environment, decline of fisheries resources and the increasing number of endangered species, reduce overcapacity, and improve the efficiency of fishing operation and economic benefits".*[8]

Furthermore, the Policy Recommendation report to the Government of China (CCICED, 2010) produced by the China Council for International Cooperation on Environment and Development indicated the following areas of concern:

- Pollution of the offshore environment: in 2009, the offshore polluted ocean area of China exceeded 50% of the total offshore ocean area;
- Damage of the offshore ocean ecosystem: "*compared with the 1950's, China has cumulatively lost some 50% of coastal wetlands, 57% of the mangrove areas, 80% of its coral reefs, with more than two thirds of the coast eroded*";
- Severe decline of ocean biological resources due to overfishing and land reclamation, which "*destroyed the spawning ground of fish or the habitats of their larvae/juveniles, resulting in resource exhaustion of some fishery species*";
- Impact of developments in river basins and coastal lands on the ecosystems of China's ocean, a problem that is worsened by the lack of a comprehensive strategic plan considering the impact of inland activities on the sea. The CCICED also indicates institutional deficiencies: "*different marine resources or ecological factors are managed by different agencies*";
- Further to the above, the CCICED remarked the lack of a green development strategy for China's seas, a view that is supported by Buluswar *et al.* (2011) who recommend the inclusion of sustainability principles for fisheries and aquaculture for the subsequent Five-Year Plans of China.

With regard to the **state of the fish stocks**, the country fisheries profile of FAO notes the "*increasing decline of traditional high quality fishery resources and leading to catches comprising immature, small-sized and low value organisms*". The University of British Columbia research (www.seaaroundus.org/eez/156/101.aspx) shows that 30% of all fish stocks in China's Exclusive Economic Zone have been reported as "*collapsed*" with an additional 20% as "*overexploited*" (2006). This is confirmed by FAO (2010): *"Total production in the Western Central Pacific grew continuously to a maximum of 11.4 million tonnes in 2007 and then decreased slightly in 2008. This area contributes about 14 percent*

of Yangtze River artificial reproduction; and investigation and research on main fishing gear and fishing methods in marine capture fisheries.

[7] The Chinese Government's Official Web Portal defines the State Oceanic Administration (SOA) as "an administrative agency under the Ministry of Land and Resources, P.R.C. for the supervision and management of sea area uses and marine environmental protection, safeguarding national maritime rights and interests according to laws and regulations, and organizing and carrying out marine scientific and technical research." (http://english.gov.cn/2005-10/01/content_73182.htm).

[8] The Programme set medium-term objectives, i.e. "by 2020, for gradual rehabilitation of the aquatic environment, decline in fisheries resources will be reversed and endangered species will not increase. Fishing capacity and catch from marine capture fisheries should generally match the capacity of fishery resources. The fleet will be further reduced (to 160,000 vessels with total power of 10 million kW), catch reduced (to 10 million tonne) and re-stocking enhanced (by release of 40 billion fry annually). The number of nature reserves for living aquatic resources above provincial level should increase to over 200" (FAO country fishery profile)

of global marine production. Despite this apparently positive situation, there are reasons for concern regarding the state of the resources, with most stocks being either fully exploited or overexploited (many also depleted), particularly in the western part of the South China Sea".

2 CATCHES[9]

KEY FINDINGS

- The People's Republic of China, which tends to over-report its domestic marine catch massively under-reports (to FAO) the catch of its distant-water fleets.
- We estimate that China has a distant water fleet of around 3,400 vessels, including its fleet fishing in neighbouring Japan and South Korea, or just under 900 vessels excluding Japan and South Korea.
- The catch of China distant water fleet is estimated here at 4.6 million tonnes per year (± 687,000 tonnes per year) for the 12 year period from 2000 to 2011, including Japan and South Korea corresponding to an ex-vessel value of 8.93 billion €/year (± 1.53 billion €/year).
- A first-order estimate of potential IUU catches around the Africa region shows around 2.5 million tonnes per year, of the estimated Chinese distant water catch of about 3.1 million tonnes per year in the African region, may be unreported.
- Similarly, the disposition of this catch is unclear, though there is evidence that some of it ends up on international markets, notably in the European Union.
- Finally, in the spirit of fairness, we should re-iterate that our methodology does not allow for distinguishing legal from illegal catch, and that newspaper accounts of 'illegal fishing' may refer to vessels that are fishing legally, but under access agreements which have not been made public.
- Thus, in analogy to our suggestion not to use the extremes of our confidence intervals to summarize our findings, we urge readers not to infer from the large fraction of IUU catches by the Chinese distant-water fleet estimated here that its catches consist only, or even mainly, of illegally caught fish.

2.1 Introduction

By the end of the 20th century, the People's Republic of China (herein referred as PRC or 'China', and excluding Taiwan, Hong Kong and Macau) had become a major distant-water fishing nation. However, at first it was lacking the specialized vessels required for distant-water fishing, and the infrastructure required for supplying such vessels. Thus, initially, China simply 'exported' its coastal fleet, mainly consisting of bottom trawlers, to whichever foreign country it was operating in (Pang and Pauly, 2001).

At the onset of the 21st century, however, this had changed, as specialized 'catcher' vessels (bottom trawlers still, but also purse seiners, squid jiggers, longliners, etc.) supplied by mother ships deliver their catch to strategically located freezer facilities, supplying local, international and its own domestic markets. These are all remarkable achievements in technology, logistics, and business, mirroring other sectors of the Chinese economic expansion into the rest of Asia (Gaullier *et al*., 2007), Africa (Zafar, 2007; Beuret *et al*., 2008), Latin America (Ferchen, 2012) and Oceania (Wesley-Smith, 2007).

[9] This section is based on work performed by a team from the *Sea Around Us* Project, i.e.: Daniel Pauly, Dyhia Belhabib, William Cheung, Andrés Cisneros-Montemayor, Sarah Harper, Vicky Lam, Yinying Mai, Frederic Le Manach, Ka Man Mok, Liesbeth van der Meer, Soohyun Shon, Wilf Swartz, U. Rashid Sumaila, Reg Watson, Dirk Zeller and Leilei Zhai. Henrik Österblom from the Stockholm Resilience Centre, University of Stockholm, also contributed to this section.

Unfortunately, what did not improve in the transition to the 21st century – occasionally seen as the start of an age of transparency (Sifry, 2011) – is the tendency toward secrecy in fisheries data, and the near complete disregard for public accountability of the use of public fisheries resources. Thus, there are no publically accessible databases of access agreements between China (or Chinese companies) and the countries in the Exclusive Economic Zone (EEZ) of which Chinese fishing vessels operate, unlike the European Union (EU), which provides in its law database (http://eur-lex.europa.eu) all texts related to fishing access agreements with other countries, even if the agreements themselves are often questionable (Kaczynski and Fluharty, 2002; Kalaidjian, 2010).[10] Therefore, the activities and catches of the Chinese distant-water fleets are almost completely undocumented and unreported, and often, as we shall see, may actually be illegal, thus spanning the entire gamut of IUU fishing (Bray, 2000).

China's massive over-reporting of its domestic marine fisheries catches was clearly illustrated by Watson and Pauly (2001). Chinese over-reporting of its domestric catches was evidenced by 1) the major assessed populations of fish along the Chinese coast having been classified as overexploited decades ago, while fishing effort continued to climb; 2) estimates of catch per unit of effort (based on official catch and effort data) being constant for domestic waters during the 1980s and early 1990s, i.e., a period of continually increasing effort and reported catches, in contrast to survey data showing declining abundances; and 3) catch per area being far higher than would be expected, when compared with areas similar in oceanographic and production factors (Watson and Pauly, 2001). The factors driving such over-reporting were discussed in Pang and Pauly (2001), and essentially are a perverse result of a planned centralized economy that rewards Chinese officials for appearing to fulfil the plan (thus providing a powerful incentive for over-reporting production) combined with the absence of a government-independent statistical system. These factors continue to be at work in the Chinese marine fisheries sector, still dominated by state fishing companies, although private companies have made major inroads in the last decade. One notable example is Pacific Andes, one of the largest private fishing companies on the planet (also see box on section 5.4). These factors are also the reasons why it will take a long time until China submits to the Food and Agriculture Organisation of the United Nations (FAO), of which it is an influential member, catch statistics with connections to reality (Figure 2.2), despite some recent attempts at cosmetic corrections (FAO, 2010).[11]

In contrast to over-reported domestic catches, the secrecy alluded to above, together with the absence of an independent statistical system, combine to foster non-credible low catch reports – about 368,000 tonnes on average (by China to FAO) for all Chinese vessels operating outside FAO Statistical Area 61 (Western North Pacific), where China is geographically located (Figure 2.1).[12,13]

[10] There is, in recent years, a trend toward private companies from EU countries negotiating private agreements with host countries, or host country companies, which are, as well, generally not publicly available. These agreements are not officially condoned by the EU.

[11] These attempts slightly modify the domestic marine catches, which had been declared constant since 1998 under the 'zero growth' policy, and in no way make these official catches closer to reality (see Pauly and Froese, 2012).

[12] An alternative explanation could be that the reported Chinese catches were simply partially misallocated in terms of FAO statistical areas by either the Government of China and/or FAO statistical staff.

[13] We shall not deal here with the fact that the People's Republic of China, because of the huge size of its claimed Exclusive Economic Zone (EEZ; see Figure 2.1), is in dispute with Japan, South Korea and Taiwan, and with all Southeast Asian countries bordering the South China Sea, i.e., Brunei Darussalam, Indonesia, Malaysia, the Philippines and Vietnam (see, e.g., Smith (1986), especially p. 28-29, on how EEZ ought to be designed and disputes resolved). Also note that Taiwan makes essentially the same vast claims as China, but does not attempt to enforce them.

Given these circumstances, obtaining an estimate of the actual catch of Chinese distant-water fleets must be based entirely on non-official sources. Consequently, we used here methods which could accommodate unconventional sources, relying on the fact that any collective activity of the scale considered here is bound to generate a 'shadow' on the societies it is embedded in, and which it impacts (Pauly, 1998). From this 'shadow', the scale of the activity in question can be inferred, if often imperfectly and thus requiring further examination.

The second conceptual tool at our disposal is the concept of a (large) Fermi solution. In physics, when faced with the need to estimate unknown quantities from limited data, an approach is often used named after the physicist Enrico Fermi. This is commonly illustrated by his estimation of the number of piano tuners in Chicago, in the absence of specific data.[14] For this, he broke the problem down into parts about which he did have data - number of pianos per households, number of households in Chicago, frequency with which pianos needed to be tuned, etc., then computed his estimate (von Baeyer, 1993). What is obtained with this method is not a definitive number, but rather a reasonable estimate, on the basis of which one can then identify critical steps requiring further examination.

Fermi solutions can be made vastly more reliable by combining their parameter approach with the Monte Carlo method (Buckland, 1984), which considers the uncertainty associated with each parameter (or terms of the equations in question), and which is extensively used in fisheries research, where high uncertainties are the norm (see, e.g., Rosenberg and Beddington, 1987; Uhler, 1979), especially regarding catch levels (Ainsworth and Pitcher, 2005; Tesfamichael and Pitcher, 2007). Herein, the solution is recomputed thousands of times, by randomly selecting different values for each parameter drawn from the probability distribution specified for each parameter. This helps to quantify the range of values and the level of uncertainty of the estimates from the Fermi solution.

Thus, we shall here present the data which allow a preliminary estimate of the catch of Chinese distant-water fleets, explain our computational methods, assess their uncertainty, outline the results and finally discuss some of their implications.

2.2 Methodology

We define 'Chinese vessels' as boats with officers and crew from the People's Republic of China (and not Taiwan), irrespective of their flag. Due to the widespread use of 'flags of convenience' as well as 'charter' and 'joint venture' arrangements, which tend to obscure actual beneficial ownership, control and proper compensation through access fees, the flag a vessel is flying may have little bearing on the actual targeted disposition and associated profit ownership of the landed catch (Gianni and Simpson, 2005; Griggs and Lutgen, 2007). We found no instance of Chinese officers and non-Chinese crew, in stark contrast to the often mandated practice of EU vessels having EU officers and local (i.e., non-EU) crew.[15] This is a reasonable assumption, as there are likely few (if any) instances in which a fishing boat that is not owned, directly or indirectly, by a Chinese firm (irrespective of the flag flown) is operated by Chinese officers and crew.

[14] Another example of this is the 'Drake Equation', used to estimate the number of extraterrestrial civilizations (for example in our galaxy) based on the number of stars, the number of potentially life-bearing planets per star, the fraction of such planets with some forms of life, etc. Some versions of the Drake Equation lead to high estimates of the number of extraterrestrial civilization, which gives weight to Fermi's question, when confronted with these results: 'Where are they?'

[15] We found only one reported instance of a Taiwanese vessel, operating off the Pacific Coast of Costa Rica being crewed and captained by mainland Chinese (http://www.protect-the-sharks.org/shark-finning/chen-chieh-21/).

The procedure used here to estimate the catch by Chinese distant-water fleets consist essentially of 5 steps:

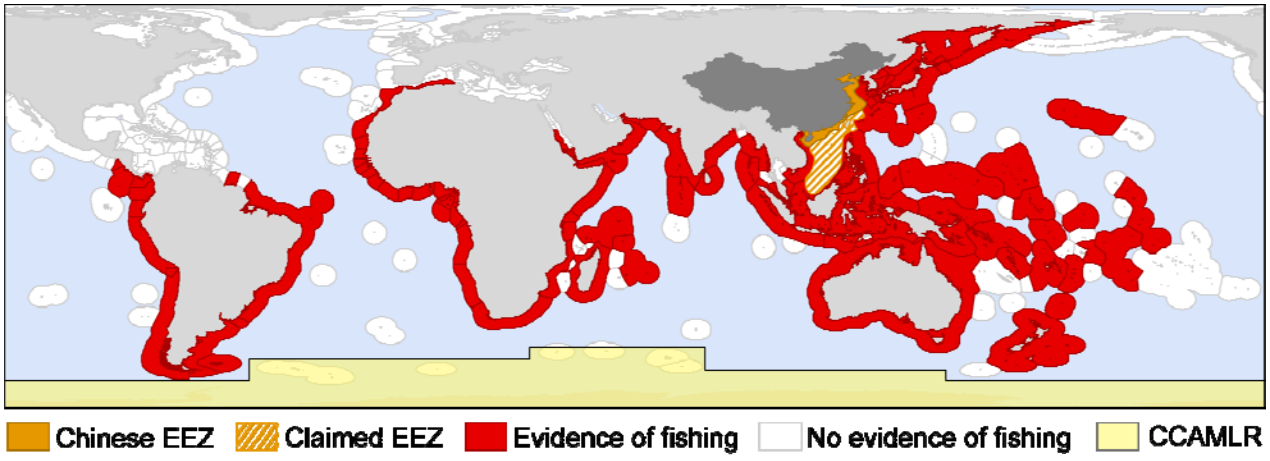
1. Establish the presence of Chinese vessels in the EEZ of a given country and year;
2. For countries and years where such presence was established, record the number of vessels involved, or assign a likely number of vessels to that country and year, given the nature and contents of the available document(s);
3. Assign an annual catch and catch value to each vessel, by vessel type;
4. Repeat (3) for all countries and years, and add up catches and catch values across countries and territories;
5. Conduct a Monte Carlo simulation by repeating step (4) 10,000 times for input values (number of vessels by country, catch per vessel, etc.) drawn from distributions whose shapes are determined by the values obtained in steps (1-3) or independently. Probability distributions of the estimated total catches and catch values of the Chinese distant water fleets are then calculated, from which we compute the mean and associated uncertainty of the final result.

Details on these five steps are shown in Annex I.

2.3 Results and discussion

Overall, more than 450 reports were obtained from the scientific literature, newspapers, magazines, other media outlets and websites, both Chinese and non-Chinese, which attested to the presence, legally sanctioned or not, of Chinese vessels in the Exclusive Economic Zones of 79 maritime countries and/or their overseas territories, and in Antarctica (Figure 2.1).

Figure 2.1: Exclusive Economic Zones of countries or territories where Chinese vessels were reported to operate (legally or not) in 2000-2011.



Source: Over 450 reports in the scientific literature and media reports gathered by the *Sea Around Us* project.

As illustrated by Figure 2.1, the only large regions of the world where Chinese distant water vessels do not appear to operate is the Arctic, the coast of North America, the Caribbean, and European waters.

2.3.1 Catches

Table 2.1 presents our key results, i.e., estimates of the catch by Chinese vessels in different regions of the world, with a measure of their uncertainty. Note that we do not present results by country as these are too uncertain; only in the aggregate is our method likely to generate reasonable results. We also abstained from presenting separately the

result for 2000-2005 and 2006-2011, as there were, at the regional level, no significant differences between these two periods. There were significant differences in the number of vessels of various types for these two periods, and hence estimated catches at the country level, but as mentioned before, we consider our method to be less reliable when results are disaggregated.

Table 2.1: Estimated annual catch by vessel type of the Chinese distant-water fleets from the Exclusive Economic Zones of maritime countries and territories (and adjacent high sea areas), 2000-2011.

Region	Annual catch by gear (1000 tonnes)					
	Miscellaneous boats	Bottom trawlers	Purse seiners	Tuna longliners	Tuna purse seiners	Total (± st. dev.)
West Africa	15.0	2,355.0	554.7	11.4	4.7	**2,941 ± 631**
East Africa	2.7	119.0	18.0	11.7	29.5	**181 ± 59**
Asia (excl. Japan and South Korea)	32.5	697.0	127.0	24.1	67.5	**948 ± 241**
Japan and South Korea	See Table A.I.2 in Annex I for details on catch by vessel type[1]					**106 ± 16**
Oceania	3.5	18.4	0.0	84.3	91.9	**198 ± 31**
Central and South America	34.0	109.7	31.7	7.0	0.0	**182 ± 53**
Antarctica	1.0	0.0	46.6	0.0	0.0	**48 ± 26**
Total	--	--	--	--	--	**4,604 ± 687**

[1] Standard deviation based on the same coefficient of variation as total catch without Japan and Korea.

Source: *Sea Around Us* Project

As might be seen in Table 2.1, overall, Chinese fleets catch an estimated 4.6 million tonnes per year outside their domestic waters. In terms of regions, Africa is where Chinese distant water fleets extract the largest catch, about 3.1 million tonnes per year, followed by Asia (948,000 tonnes per year excluding Japan and South Korea, slightly over 1 million tonnes per year with Japan and South Korea), Oceania (198,000 tonnes per year), Central & South America (182,000 tonnes per year), and Antarctica (48,000 tonnes per year).[16]

2.3.2 IUU catches

These catch estimates can be compared with the catches that China officially reports for its distant water fisheries, which can be done using two different approaches. The first is by relating our estimates to the catch that China reports to FAO, or more precisely, to the Chinese catch that are assigned (by China and/or the FAO) to all FAO Statistical Areas other than Area 61 (i.e., the Northwest Pacific, which also includes Japan, North & South Korea and the Russian Far East). On average, this was 368,000 t/year (see Figure 2.2), or 8% of the global Chinese distant-water catch estimated (Table 2.1), minus their average

[16] The uncertainty surrounding these catch estimates is relatively high (Table 2.1). This is an expected feature of our results, given the underlying data used. We do hope that the readers will not choose one of the extremes of the 95% confidence intervals that can be calculated from our results to support preconceived notions about Chinese distant-water catches (We remind the reader that 95% confidence intervals can be obtained by subtracting from, and adding to the mean the standard deviation times 1.96). Rather, we insist, it is the midpoint estimate that should be used for reference

catch in Japan, (North &) South Korea (Table 2.1) and the Russian Far East (an estimated 42,217 t/year). This leads to a hypothetical reporting rate of 8%, which is too low, because, as mentioned above, the Chinese distant-water fleets report some of their landings as 'national catch' of the countries in whose EEZ they operate (e.g., as joint ventures or charters), or as catch of the countries providing them with flags of convenience.

We can derive a first-order estimate of potential IUU catches by Chinese vessels around the Africa region by comparing our distant water catch estimate (Table 2.1.) with the sum of Chinese FAO reported catches for this area and the Chinese component of joint-venture/charter/reflagging catches reported by African countries (Table 2.2). This suggests that around 2.5 million tonnes per year of the estimated Chinese distant water catch of about 3.1 million tonnes per year in the African region may be unreported. However, it is feasible that a fraction of these unreported catches may be spatially misreported as Chinese FAO area 61 (NW Pacific) catches, and hence partially account for the massive over-reporting from this area (see Figure 2.2).

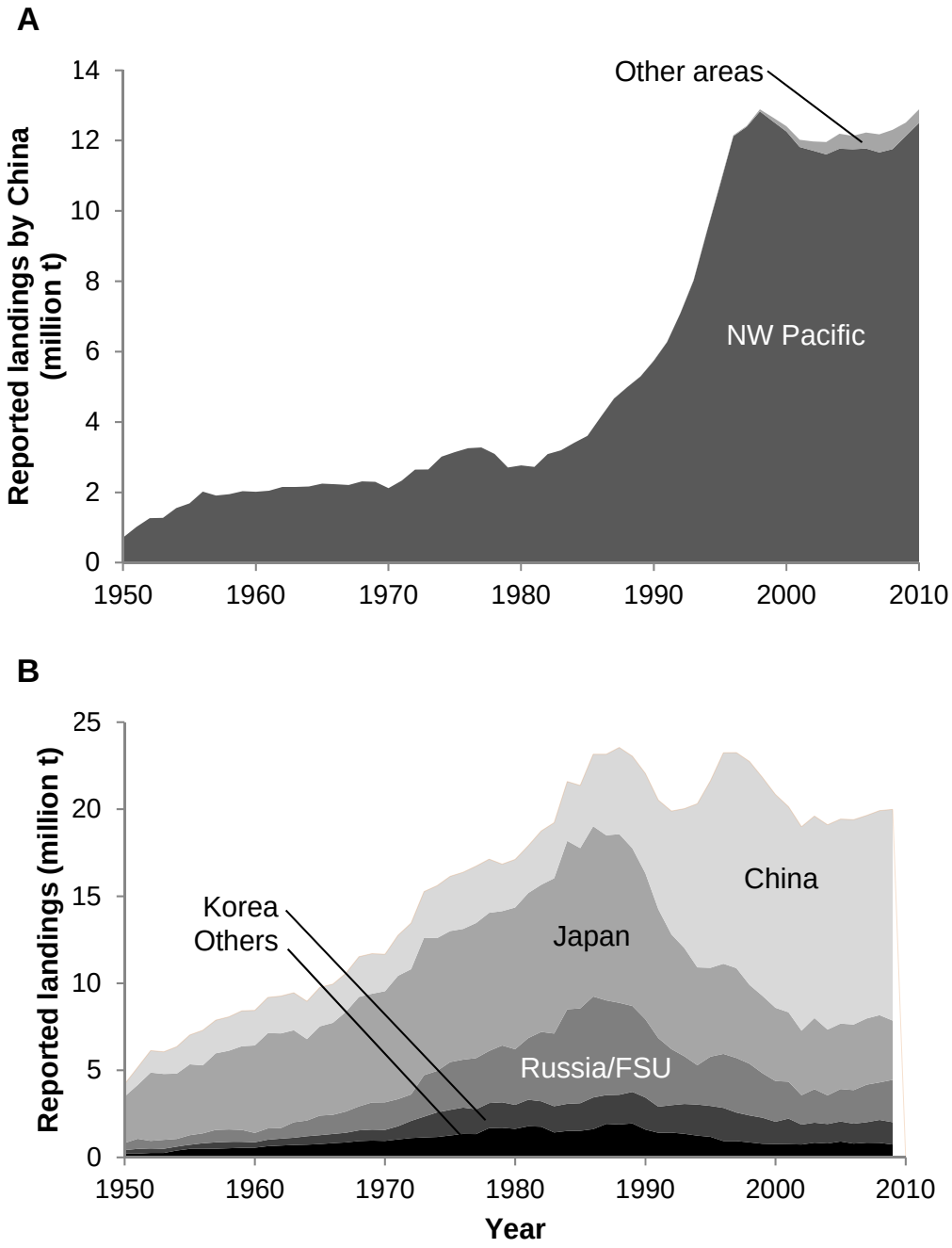
Table 2.2: Potential Chinese IUU catch for the African and West Asian region for 2000-2011 (FAO areas 34, 47 and 51), based on contrasting the estimated Chinese distant-water catches in that region (as derived from Table 2.1) with Chinese FAO data and African joint venture/charter and re-flagging data reported by African countries as 'national' catches but deemed Chinese catches based on our definitions.

Region (FAO area)	Average annual catch 2000-2011 (1000 t)			
	China DWF[1]	China FAO[2]	Joint-venture/ charter/reflagged catch[3]	Difference (= Chinese IUU catch)[4]
North West Africa (34)	2648 ± 62	17.8	457.4	2172.8
South West Africa (47)	293 ± 15	2.4	38.8	251.8
East Africa[5] (51)	181 ± 59	8.7	13.7	129.9
West Asia[6] (51)	165 ± 66		32.6	128.1

[1] Based on the present study, see Table 2.1;
[2] Landings from FAO areas 34, 47 and 51 reported by China to FAO;
[3] Catches by Chinese vessels under joint-venture/charter/reflagged arrangements and reported by the host country to FAO as 'national' catches;
[4] Derived as the subtraction of FAO China and Joint-venture/charter/reflagged from the Chinese distant-water catches as reported in Table 2.1;
[5] From eastern South-Africa to Sudan including the islands of the Western Indian Ocean;
[6] North Western Indian Ocean from the Red Sea (Saudi Arabia), the Gulf of Aden, Persian Gulf and Gulf of Oman to the Maldives and western half of India.

Source: *Sea Around Us* Project

Figure 2.2: Marine fisheries landings as reported by FAO on behalf of its member countries.



A: Marine fisheries catches of China, as reported to FAO, featuring the small (13%) correction to the flat domestic catches decreed by the Chinese central government since 1998, which followed on a non-credible increase from the mid-1980s to 1998 (Watson and Pauly 2001), and the equally non-credible low catch that China reports for its distant-water fisheries, i.e., outside of FAO area 61 (Northwest Pacific). **B**: Catches of the four major fishing countries and 'others' in the Northwest Pacific (FAO area 61), illustrating how radically the trajectory for the Chinese reported catch differs from that of the other countries in its region.

Source: *Sea Around Us* Project (modified from Pauly and Froese, 2012).

The other approach is to rely on the official data in Table 2.3, which suggest that the distant-water fishery catch of China from 2000 to 2010 was about 1.1 million tonnes per year, i.e., less than one quarter of our estimate.

Table 2.3: Official catch of the Chinese distant water fishery, 2000-2010 (based on successive editions of the China Fishery Statistical Yearbooks (2000-2010), with provincial data aggregated to all-China level.

Year	Total catches (t)	Landing in foreign countries (t)	Landing in China (t)	Number of vessels
2000	865,182	-	490,604	1,719
2001	884,878	-	482,614	1,897
2002	1,096,445	243,948	705,476	2,043
2003	1,157,653	370,373	792,049	1,997
2004	1,451,074	471,799	997,459	1,996
2005	1,438,084	516,282	717,141	2,122
2006	1,090,663	482,228	403,774	1,599
2007	1,075,151	487,422	588,540	1,496
2008	1,083,309	457,240	629,069	1,462
2009	997,226	497,813	479,413	1,815
2010	1,116,358	511,014	605,344	-
Mean	1,114,184	448,680	626,498	1,815

Source: *Sea Around Us* Project

Our knowledge of the disposition of this catch is also spotty. For the West African region, we inferred (from an interview we conducted with a Chinese national who did a tour of duty with a Chinese fishing firm operating in that region, and from scattered newspaper accounts) that roughly one-third is landed locally, one third (mainly invertebrates and high value fish) goes to the international markets (notably the EU and Japan), with the remaining third (mostly medium and large demersal fish, and shark fins) going back to China.[17]

Occurrence of IUU fishing has been positively correlated to governance capacity of affected countries (Agnew *et al.*, 2009). Several organisations for governance of high seas fisheries are performing poorly (Cullis-Suzuki and Pauly, 2010) and likely have a limited capacity to collect information on IUU activities. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), with a mandate to manage fishing in the Southern Ocean, includes many countries with high governance capacity (Österblom *et al.*, 2010), score high on several performance measures (Cullis-Suzuki and Pauly, 2010) and have a relatively high capacity to detect IUU fishing. Despite these conditions, CCAMLR illustrates the need to include complementary information on IUU fishing from non-official sources. For example, four vessels associated with private Chinese companies have been officially blacklisted for IUU activities in the Southern Ocean (CCAMLR, 2009, 2012). However, reports from the licenced fishing industry suggest that several additional vessels from the same companies were actively engaged in IUU fishing in the region (COLTO, 2003). Court proceedings show that these vessels were operating in well-coordinated fleets, where the least valuable vessels could be sacrificed for the benefit of the fleet (ITLOS, 2002). Such coordination has implication for economical analyses investigating the incentives for engaging in IUU fishing (Sumaila *et al.*, 2006).

2.3.3 Landed value

The uncertainty of the landed value of the estimated catch presented in Table 2.4 is also rather high. The midpoint estimate for catch value of all catches of the Chinese distant–water fisheries is €8.93 billion, i.e., nearly 10% of the estimated global total ex-vessel

[17] This person prefers to remain anonymous

landed value of the world catch of roughly €92.4 billion (Sumaila *et al.*, 2007). However, this percentage is elevated because our estimate of the Chinese distant–water landed value includes IUU catches, while the Sumaila *et al.* (2007) estimate of the ex-vessel value of global marine catch does not. Yet we now know, from the work of Zeller *et al.* (2006a, 2006b, 2007, 2008, 2011a, 2011b) and contributions in Zeller and Harper (2009) and Harper and Zeller (2011), that the catches reported by countries to the FAO, which formed the basis of the Sumaila *et al.* (2007) estimate, are systematically underestimated, by about 30-50% in developed countries, and more than 100% in many developing countries. The estimates of gross revenues or landed values of the Chinese distant-water fleet presented in this study should eventually allow further economic analysis, such as determining the profitability of the fleets involved, the level of impact through value lost to 'host' countries, and the food security implications for these countries as a result of Chinese distant-water fishing activities.

Table 2.4: Estimated annual landed value by vessel types of the Chinese distant-water fleet from the Exclusive Economic Zones of maritime countries and territories (and adjacent high sea areas), 2000-2011.

Region	Landed (ex-vessel) value (€ billion / year)					
	Miscellaneous boats	Bottom trawlers	Purse seiners	Tuna longliners	Tuna purse seiners	Total (± st. dev.)
West Africa	0.03	4.74	0.70	0.03	0.01	**5.52 ± 1.40**
East Africa	0.01	0.24	0.02	0.03	0.09	**0.39 ± 0.13**
Asia (excl. Japan and South Korea)	0.06	1.40	0.16	0.07	0.20	**1.89 ± 0.53**
Japan and South Korea	not estimated by vessel type[1]					**0.17 ± 0.03**
Oceania	0.01	0.04	0.00	0.23	0.28	**0.55 ± 0.10**
Central and South America	0.06	0.22	0.04	0.02	0.00	**0.34 ± 0.11**
Antarctica	0.002	0.00	0.06	0.00	0.00	**0.06 ± 0.04**
Total	--	--	--	--	--	**8.93 ± 1.53**

[1] The standard deviation of the catch value for Japan and South Korea was estimated based on the coefficient of variation of the catch value without Japan and South Korea.

Source: *Sea Around Us* Project

3 FISHING FLEET

KEY FINDINGS

- China reported to the FAO, in 2007, a total of 289,000 motorised fishing vessels active in marine fisheries with a total combined power of 14.7 million kW. However, fleet estimates are uncertain, particularly in relation to smaller scale coastal vessels.
- Fleet capacity reduction strategies have had only limited success. Excess fishing capacity continues to be a major impediment to the effective management of marine resources in China, generally suffering from over-exploitation.
- Registration of fishing vessels is handled by regional offices responsible for fisheries management such as the Port Supervisory Authority under the Bureau of Fisheries. The system is highly de-centralised as the harbour master of the vessel's home port is responsible for the registration of the fishing vessel.
- Existing data on vessel registration and authorisation to fish appear to be relatively complete in China, when considering international requirements on vessel lists. However the information is not readily available and it appears to be fragmented and not entirely consistent.
- Trawl fisheries dominate, accounting for almost half of domestic production, in the three management areas under Chinese jurisdiction; East China Sea, Yellow and Bohai Sea, and South China Sea.
- Currently, marine fishing in China is predominantly a privately-operated economic activity with ownership by individuals, companies and fishing collectives.
- The development of the DWF fleet is recent, starting in 1985, but has now expanded to 1,900 DWF vessels in 2010 from squid, tuna and demersal fisheries, in particular.
- Distant water fishing is one of the strategies to reduce the pressure on China's traditional fishing operations in coastal and inshore grounds.
- The DWF industry has evolved from being entirely state-owned to being 70% privately owned. A third of the industry is composed of a large Chinese state-owned enterprise, Chinese National Fisheries Corporation, and its subsidiaries.
- China now has the largest DWF fleet in the world, but its production capacity and industrial scale is much smaller than that of developed countries due to factors such as inadequate equipment and lack of technology, being constituted by relatively old vessels which lack long-range sea-going capability.
- The DWF sector appears to depend heavily on subsidies to survive. It is however the stated goal of the Government to modernise and expand (and restructure) the sector. China's shipbuilding industry appears to have reached the necessary level of refinement to support such a modernisation of the fishing fleet.

This section reviews and presents the findings regarding the Chinese fleet. This includes aspects such as the size of the fleet and evolution over time (section 3.1), the zone of activity of the Chinese fishing fleet, main fishing gear, and main ports for marine capture fisheries landings (section 3.2), distant-water fisheries and fleet ownership (section 3.3), register of fishing vessels (section 3.4), and adjustment measures (section 3.5).

3.1 The fleets and evolution over time

3.1.1 The fishing fleet

In 2000 the first ever national marine fishing boat census was carried out for China's three fisheries administrative zones (Bohai and Yellow Seas, East China Sea, South China Sea), resulting in an estimated total of 244,300 registered motor fishing boats with a total GRT of 5.41 million and a total power of over 12 million kW (Pang and Pauly, 2001). The census identified that a substantial proportion of boats lacked one or more of the necessary documents to carry out fishing (i.e. a) fishing vessel inspection document; b) fishing vessel registration document; and c) fishing permit).

A large proportion of the fleet appears to consist of relatively small boats. According to Pang and Pauly (2001) there was an explosive growth of the number of small vessels since 1985, which was a result of two factors: (i) the relaxation of price controls over fishery products in 1985, making fishing more profitable and (ii), the mass migration of workers to coastal areas.

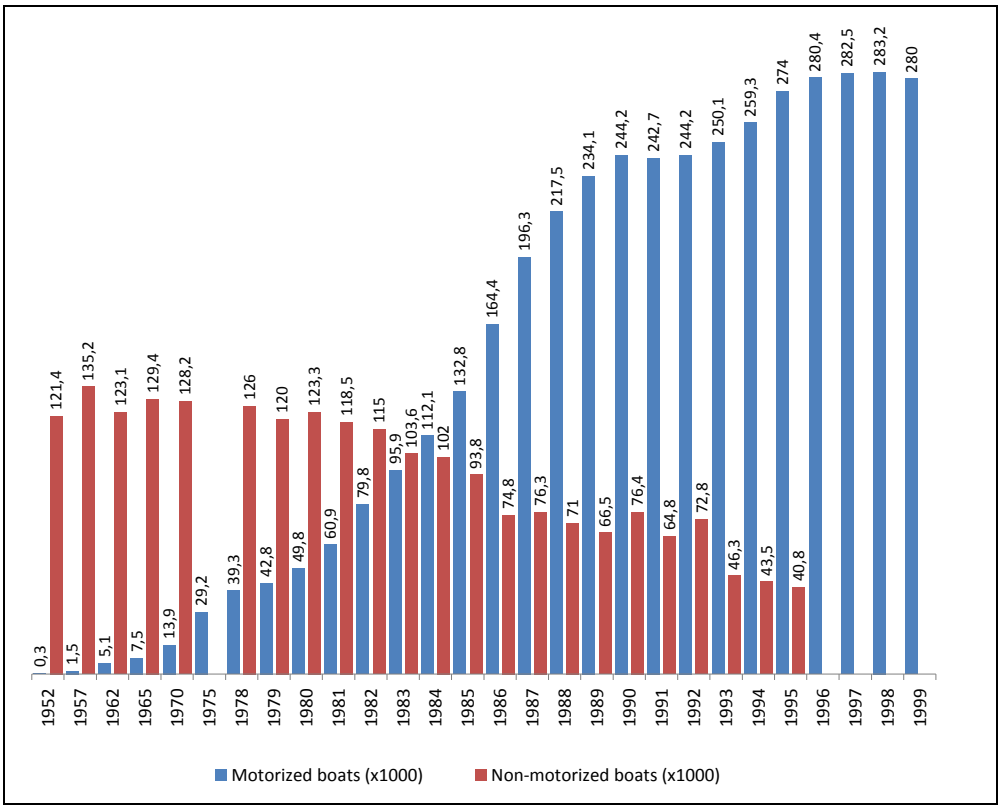
The evolution over time of the Chinese fishing fleet is presented in Figure 3.1 Note that the fleet of motorized vessels more than doubles from the period 1985 to 1999. The rate of increase is particularly strong in the late 1980s, where the fleet almost doubles during a 5-year period. Also the number of non-motorized vessels has gradually decreased over time.

There appears to be a discrepancy between estimates of total motorized vessels in Figure 3.1 and the national fishing boat census referred above. If in 2000 the census estimated 244,300 motorised vessels then this would imply that more than 40,000 vessels were retired between 1999 (280,000 motorised vessels according to Figure 3.1) and 2000, which is highly unlikely. This inconsistency may be due to the use of different data sources. It may also reflect a distinction between registered and actually operating vessels, with the higher estimates referring to estimates of operating vessels.

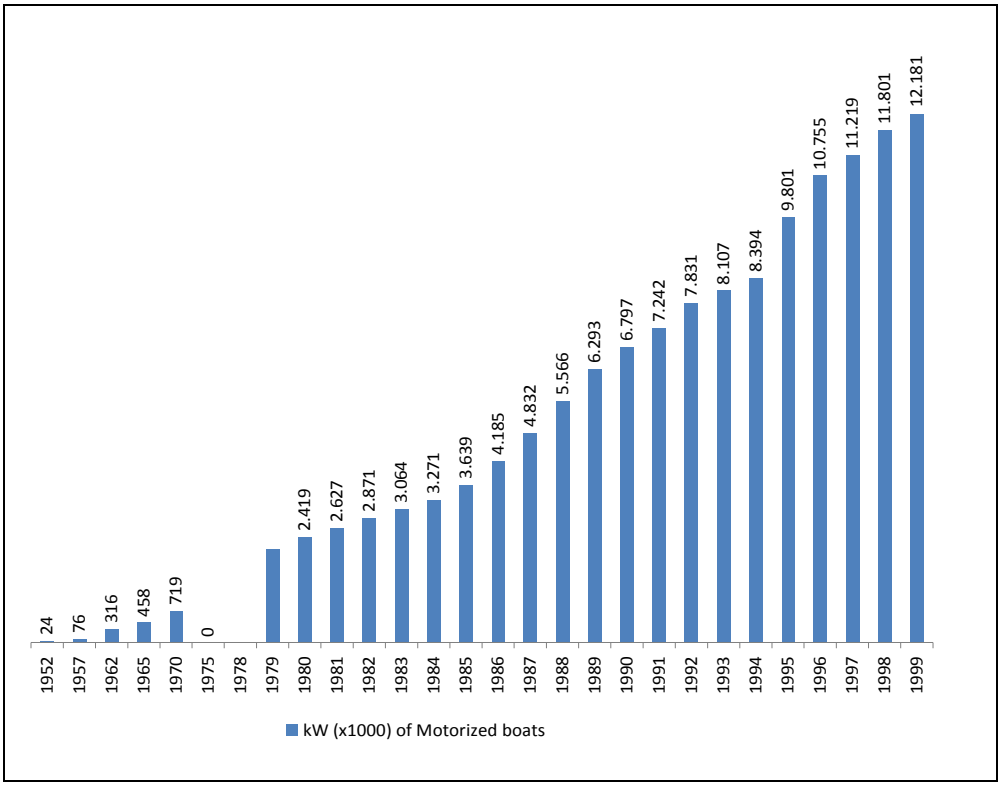
Figure 3.1: Growth of the Chinese fishing fleet, 1952-1999, based on official statistics:

A. vessels number (all units x 1000); B. fishing power (kW), kW is aggregated. Note interrupted time scale.

A.



B.



Source for figure 3.1 (a), (b): Watson *et al.*, 2001. The Marine Fisheries of China: development and reported catches. Fisheries Centre Research Reports Vol. 9, No. 2 (based on data from China Sustainable Development Information Network-Ocean http://sdinfo.coi.gov.cn) and State Oceanic Information Network (http://www.coi.gov.cn).

More recent data is provided in the following Table 3.1. These are data reported by China to the FAO, including all vessels involved in fisheries (i.e. marine, inland, aquaculture, and fisheries control vessels). China has generally provided only a summary table, which shows continuous increase in terms of total number of vessels, tonnage and power. The lack of detail concerning Chinese fleet statistics generally makes it difficult to compare different sources over time[18].

Table 3.1: Estimates of vessel numbers, total tonnage and total power reported to the FAO by China in 2000-2010.

Year	Number	Tonnage (GT)	Power (KW)
2000	487,297	6,849,326	14,257,891
2001	479,810	6,986,159	14,570,750
2002	478,406	6,933,949	14,880,685
2003	514,739	7,245,989	15,735,824
2004	509,717	7,115,195	15,506,720
2005	513,913	7,139,746	15,861,838
2006			
2007	576,996	7,806,935	17,648,120
2008	630,619	8,284,092	19,507,314
2009	672,633	8,595,260	20,567,968
2010	675,170	8,801,975	20,742,025

Source: Data provided courtesy of FAO, Fisheries Statistics and Information Service (FIPS)

However, the FAO has recently had access to more detailed data since 2007, which provides an estimate of 204,000 vessels operating in marine fisheries in 2010 (Table 3.2). The available data spans a limited time period (2007-2010), but it appears that the number of marine fishing vessels has been stable around an average of 205,000 in recent years. Unfortunately, the corresponding information on tonnage and power to show the evolution in terms of fishing power is not available.

Table 3.2: Estimates of vessel numbers, total tonnage and total power reported to the FAO by China in 2007-2010.

Activity		2007	2008	2009	2010
Capture	Marine	207,353	199,949	206,923	204,456
Capture	Inland waters	172,836	216,571	223,912	226,535
Aquaculture	Marine	66,821	74,283	74,448	78,685
Aquaculture	Inland waters	94,708	106,539	132,015	130,720
Support vessels		35,278	33,277	35,335	34,774

Source: Data provided courtesy of FAO, Fisheries Statistics and Information Service (FIPS)

[18] Discrepancies between data sources appear also to be the use of different definitions for fishing fleets, e.g. capture fisheries versus aquaculture, marine versus inland fisheries, including support vessels or not, etc. Over time there has also been a change from including all types of vessels involved in fishing activities towards the current FAO definition of fishing fleet which is vessels that are actively fishing.

According to the "State of World Fisheries and Aquaculture", published by FAO in 2010, China reported a total of 289,000 marine fishing vessels with a total combined power of 14.7 million kW in 2007.[19] This includes fleets operating in waters under the jurisdiction of China and other areas under agreements between China and the relevant countries (including Japan, Republic of Korea and Vietnam), as well as on the high seas. It is also stated that China's 2003–2010 marine fishing vessel reduction plan has aimed to achieve a marine fishing fleet of 192,000 vessels with a total combined power of 11.4 million kW. Of the global total on the number of fishing vessels powered by engines, the vast majority (75%) were reported from Asia. The rest were mainly reported from Latin America and the Caribbean (8%), Africa (7%) and Europe (4%). China accounts for a major proportion of Asian fleets. Comparing the Chinese fishing fleet's combined power with the EU, China's combined power (14.7 million kW) is more than double the EU's combined power (7.1 million kW). FAO notes however, that Chinese data requires validation in terms of a review of the fleet register (introduced in 1979, and reformed in 1986).

A recent study (MRAG, 2010), which included a survey of the Chinese fishing vessel register states that China is "believed" to have at least 300,000 motorised fishing vessels. China's proportional share of the global fishing fleet corresponds to 55% in terms of tonnage and 36% in terms of vessel numbers.

Considering the various sources on fleet statistics, China is currently estimated to have between 200,000 and 300,000 motorised vessels actively fishing in marine waters and a total combined fishing power of about 14-15 million kW (see section 3.5 on results of capacity reduction programmes). This appears however to be a conservative estimate, not covering adequately smaller vessels and non-motorised vessels. Although the Bureau of Fisheries in China publishes yearly data, this fails to provide a detailed picture of fishing capacity by different sectors and provides only the total fishing vessels and total horse power, which is not very useful (Cheng *et al.*, 2006).

More data are needed to assess fleet structure, fishing capacity and management of resources in China. It is recommended that efforts are made towards compiling these data from the various Chinese provinces and ports and made publicly available for an open and transparent peer-review.

3.2 Fishing grounds, gears, and landing sites

A relatively recent review of available information and data collection systems in China (Guo *et al.*, 2008) provides the following information on major fishing grounds, important gears and landing sites.

3.2.1 The Yellow Sea and the Bohai Sea

The catch in these fishing areas accounted in 2005 for 31% of the total reported catch of domestic marine capture fisheries. The main types of fishing are trawl, gill-nets, stow-net and line-fishing. In 2005 there were 58,952 fishing vessels, including distant-water fishing vessels. Landing sites and markets for marine capture fisheries in the Yellow Sea and the Bohai Sea include fishing ports and fish markets along the coasts of Dalian, Yingkou, Qinwangdao, Tianjin, Yantai, Qingdao and Qidong, in the Liaoning, Hebei and Shandong provinces.

[19] This is however not consistent with a total number of 207,000 marine fishing vessels given Table 3.2, which may be due to the use of different definitions. One possible explanation is that China reports vessels involved in marine fisheries and marine aquaculture.

3.2.2 The East China Sea

Although the area has seen the continuous decline of fishery resources, catches from the East China Sea still constitutes more than a third of the total marine marine catches from Chinese waters. The main fishing methods are trawling, purse seine, gillnet, stow-net and line-fishing. In 2005 there were 76,000 fishing vessels in the East China Sea. Fishing ports and fish markets for the marine capture fisheries of the East China sea are found along the coasts of Qidong, Zhoushan, Ningbo, Xiangshan, Wenzhou, Ningde, Lianjiang, Fuzhou and Xiamen, in the Shandong, Jiangsu, Zhejiang and Fujian Provinces.

3.2.3 The South China Sea

The main fishing methods are trawling, purse seine, gill-net, stow-net and line-fishing. In 2005 the catch from the capture fisheries in the South China Sea accounted for 26% of the total marine catch. In 2005 there were about 79,000 registered fishing vessels in the marine capture fisheries of the South China, including distant-water fishing vessels. Fishing ports and fish markets for the marine capture fisheries of the South China Sea are found along the coasts of Xiamen, Shantou, Shenzhen, Guangzhou, Zhuhai, Zhanjiang, Beihai and Haikou, in the Fujian, Guangdong and Hainan Provinces, and the Guangxi Chuang Municipality.

3.2.4 Major gears in Chinese fisheries

Further information is available on catches by gear provided in the FAO country profile for China. In 2004, the most common fishing gear used was the trawl net. In terms of production, trawlers accounted for 47.6% of catches, gill net accounted for near 17%, set-nets represented near 15%, lines and hooks took 6%, purse seines took 5.3%, and other fishing gear took 9%. Compared with 1999, the contribution of trawl catch was similar, but the proportion of gill net, lines and hooks and purse seines increased, while the proportion of set-nets and other fishing gear decreased. In particular, the proportion of other fishing gear decreased from 14.2% in 1999 to 9% in 2004.

3.3 Distant-water fisheries

3.3.1 Introduction

In a testimony before the U.S.-China Economic and Security Review Commission, Mallory (2012) defines distant-water (DW) as those '*major fishing areas that are not adjacent to the fishing country, such as in the exclusive economic zone (EEZ) of another host country or on the high seas*'.[20] Adding that, Article 62 of the UN Convention on the Law of the Sea (UNCLOS)[21] stipulates that when a coastal State does not '*have the capacity to harvest the entire allowable catch, it shall, through agreements or other arrangements ... give other States access to the surplus of the allowable catch*'. The 'surplus' factor is key to

[20] Note that this was also the definition used in in the section on the catch of China's distant-water fleets.

[21] China ratified the United Nations Convention on the Law of the Sea (UNCLOS) in 1996. Mallory (2012) explains that upon ratification of the Law, China both (*i*) claimed an EEZ and formally adopted an UNCLOS-based management approach to its domestic fisheries resources, and (*ii*) signed bilateral fisheries agreements with neighbouring countries. Furthermore, Mallory (2012) suggested the existence of two areas of conflict of China and UNCLOS. On the one hand, China claims that South China Sea is not clearly articulated in accordance with the provisions of UNCLOS, and some of the various bases for China's claim are not recognized as legitimate by international law. And on the other, China disagrees with UNCLOS and the United States in arguing that the interpretation of freedom of navigation in EEZs should exclude military surveys, military manoeuvres, and military reconnaissance.

understand the DW distant-water activities. Walmsley *et al*. (2007) explain that a '*surplus stock is that which is deemed to be beyond the harvesting means of the coastal state (most often tuna) or a stock not used by a coastal state (such as shrimp in earlier days)'.*

UNCLOS provisions have resulted in the establishment of fisheries agreements permitting distant-water fishing fleets of one country to fish in the EEZ of a third country. According to Mallory (2012), the largest distant-water fishing countries/entities are Japan, Spain, South Korea, the former USSR/Russia, and Taiwan.

China's Ministry of Agriculture defined, in 2003, distant water fishing as '*citizens, legal entities, and other organizationorganisations of the People's Republic of China engaging in marine fishing and its processing, supply and product transportation activities on the high seas and in the sea areas under the jurisdiction of other countries, but does not include fishing activities in the Yellow Sea, East China Sea, or South China Sea*'.

3.3.2 A strategic activity

The beginning of Chinese distant-water fishing is relatively recent, starting in 1985, in an attempt to restructure the capture fisheries sector by moving fishing capacity from Chinese coastal waters to the open oceans.[22] This process started when one of China's state-owned fishing enterprises expanded outward, notably to Africa. Since then, China has made a substantial effort to develop its distant water fisheries, while restricting the development of coastal and inshore fisheries in response to overexploitation and the substantial reduction of China's offshore fishing grounds that have become joint fishing zones under bilateral fisheries agreements between China and its maritime neighbours (which came into effect in the early 2000s). Strategically, distant water fishing is one of the two outlets to reduce the pressure on its traditional fishing operations in coastal and inshore grounds, the other strategic effort being in the development of aquaculture (Xue, 2006).

Over the past three decades, China's distant-water fisheries industry has become an important component of its fisheries sector. China encourages its fishing companies to undertake joint ventures and has established numerous bilateral fisheries agreements. According to Mallory (2012), China now has the largest distant-water fishing fleet in the world with an estimated 1,900 vessels operating in 2010. During the period from 2000 to 2010 there was an average of 1,800 vessels operating in distant waters (Table 2.2).

3.3.3 Industry ownership

In 2009, the industry had 108 distant-water fishing (DWF) enterprises operating about 500 squid-jiggers, almost 400 tuna longliners, almost 800 trawlers, and over 100 purse-seiners (Mallory, 2012). The author points out: "*The DWF industry directly employs about 50,000 people. The DWF industry has evolved from being entirely state-owned to being 70% privately owned. A third of the industry is composed of a large Chinese state-owned enterprise, Chinese National Fisheries Corporation and its subsidiaries, which maintained 556 of a total of 1,652 boats in the industry in 1999. The rest of the industry is composed of regional middle-sized companies and small coastal companies*".

This indicates a gradual change in ownership structure over time, from predominantly state-run enterprises to largely private enterprises. Currently, marine fisheries in China is predominantly a privately-operated economic activity, which has had the effect that

[22] Note that what is described as the 'open oceans' in Chinese media is usually the EEZ of other countries.

fisheries statistics are not being reported in as much detail as from the state-owned fisheries in the past (Cheng *et al.*, 2006).

3.3.4 Main Chinese distant-water fisheries

Demersal fishing in Africa

West Africa has been an important fishing ground for the Chinese distant-water fleets. In fact the first fishing agreements signed in the initial stages of development of Chinese distant-water fishing involved countries such as Guinea-Bissau and Guinea. Currently, fishing agreements between China and African States reportedly involve 17 countries with a predominance of countries in West Africa. Most of the fisheries appear to be demersal trawl fisheries with a number of target species such as cuttlefish, octopus, white and tiger shrimps, yellow croakers, bobo croakers, sole, etc. In Guinea Bissau, the Chinese trawlers operating in the region are in the size class of around 200 GRT (Oceanic Development and Megapesca, 2010). Chinese distant water fleets extract an estimated 2.9 million tonnes per year in West Africa, trawling being the dominant fishing method (Table 2.1).

Purse seine vessels are involved in some countries with important small pelagic resources (e.g. Mauritania and Morocco). The China Fishery Group has recently initiated fishing for small pelagics in Mauritania, which could be an indication that production will rise steeply, assuming that the Group will be using super-trawlers (see section 3.3.6 on the China Fishery Group).

Squid

China has developed a major fishing fleet for oceanic squid since 1989, currently comprising more than 400 squid jigging boats with annual catches of 250-300 thousand metric tonnes and accounting for about one-sixth of global oceanic squid catches (Chen *et al.*, 2008). This involves five major fisheries:

- Japanese common squid in the Sea of Japan;
- Neon flying squid in the North Pacific Ocean;
- Argentinus shortfin squid in the southwest Atlantic Ocean;
- Jumbo flying squid in the southeast Pacific Ocean;
- Purpleback squid in the Northwest Indian Ocean.

The characteristics of the longer range oceanic squid jigging vessels are presumed to be similar to those included in a study of economic performance of fisheries (Tietze *et al.*, 2001). Vessels averaged 43.5m in length, 270 GRT, 440 kW, a storage hold of 167 m^3, 10-12 jigging machines, and a crew of 28-30, referring to vessels operated by a state-owned company.

Tuna

Chinese vessels are also involved in tuna fisheries, particularly in the Indian Ocean and Oceania (Table 2.1).[23] These are taken within the convention areas of tuna RFMOs and in connection with fishing agreements with a number of countries. It is likely that a substantial amount of the catches include by-catches of pelagic sharks and other large pelagics (e.g. swordfish, etc.). One should bear in mind that the main areas of tuna distribution do not include waters under Chinese jurisdiction, thus tuna catches in Chinese waters can be considered minimal.

[23] Catch estimates for Oceania and East Africa (or Indian Ocean) are 198,000 and 181,000, respectively (Table 2.1)

Table 3.3 presents the number of Chinese vessels involved in tuna fisheries, based on a survey of vessels authorised to fish in the convention areas of tuna RFMOs. The Chinese fleets operating in these fisheries are dominated by longliners. Note however that the following table included only vessels larger than 24 metres in Length Overall (LOA), which is the size of vessels that fall under the management competency of tuna RFMOS.[24,25] It does not include numerous smaller Chinese longliners that may be operating, particularly in the Southeast Asia area (i.e. in the Indian and Pacific Oceans). These smaller vessels are often implicated in IUU fishing, but the problem appears to be coming under control as a result of various efforts at national and regional level.

Table 3.3: Number of Chinese longliners greater than 24 metres LOA licenced to fish in the Indian, Atlantic and Pacific Oceans (as of September 2003). 'Duplicate' indicates the numbers of vessels counted more than once because they were licenced to fish in more than one ocean.

Fishing area	1996	1998
	24 – 35 m	larger than 35 m
Indian	72	21
Atlantic		60
Pacific	149	78
Duplicate		39
Total Chinese	221	120
Global total	1928	1590

Source: Miyake (2005)

Recent data (OPRT, 2010) indicates a trend for increasing number of vessels. In 2010, there were 138 registered with the Organisation for the Promotion of Responsible Tuna Fisheries (OPRT) - Japan.

Horse mackerel in the South Pacific

Of growing importance to the Chinese distant-water fleet appears to be the international fishery for horse mackerel in the South Pacific. The catches of Chilean jack mackerel taken by Chinese vessels have grown from 20,000 tonnes in 2001 to 64,000 tonnes in 2010 with a peak of 143,000 tonnes taken in 2008 (www.southpacificrfmo.org/catch-information). Contrary to other Chinese distant-water fleets, the vessels involved appear to be large modern super-trawlers and purse seiners. A total of 13 vessels were authorised to fish in 2010, amounting to a total of 74,516 GRT. Thus, the average vessel size was 5,700 GRT (South Pacific Regional Fisheries Management Organisation, 2011)

3.3.5 China National Fisheries Corporation

According to information provided in its website, the China National Fisheries Corporation (CNFC) operates more than 256 bottom trawlers, long-liners, merchants carriers and bunker service vessels operating mainly in the Atlantic, Pacific and Indian Oceans with an annual capture capacity of 160,000 tonnes, processing capacity of 30,000 tonnes, and a

[24] The length of 24m LOA corresponds roughly to a limit of 100 GRT.

[25] Not all vessels authorised fish are actually operating so this may over-estimate the fleet actually active in the various oceans.

trade volume of about USD 270 million, which are exported to markets in the EU, US, Japan, China, Africa, etc.[26]

In the Atlantic, the main products are cuttlefish, octopus, white and tiger shrimps, yellow croakers, bobo croakers, sole, etc., with an annual production of nearly 100,000 tonnes. CNFC has bases established in a number of West African countries to support its operations (i.e. Morocco, Senegal, Guinea, Sierra Leona, Ghana, Gabon and Nigeria). CNFC has established two factories in West Africa, one in Dakar and the other in Nouadhibou, both of which are approved for export to the EU and US. It has also established operations and processing facilities in Las Palmas and Madrid. In different countries the vessels operate under various bilateral agreements and joint venture arrangements.

3.3.6 China Fishery Group

China Fishery Group is a major fishing company specialised in trawling (with super-trawlers) for small pelagics and fishmeal/fish oil production. It started fishing operations in the North Pacific in 2001 and has since expanded to the South Pacific and West Africa. In 2004, a majority stake in China Fishery was acquired by Pacific Andes, a giant in the fishing industry. It operates 7 processing plants in Peru, showing its strategic interest in the fishmeal industry (www.chinafisherygroup.com/aboutus.html).

In October 2010, China Fishery Group started fishing for species such as horse mackerel and sardines in waters off Mauritania. Currently, the group operates a fleet of about 80 fishing vessels and supplies the bulk of its catch to China.[27] By expanding into Mauritania, it obtains access to new fishing grounds where its vessels can be used more efficiently during the off-peak season in the South Pacific, without incurring too much additional investment (http://agritrade.cta.int).

3.4 Register of fishing vessels

3.4.1 The inspection body: China's Register of Fishing Vessels

The Register of Fishing Vessels (RFV) is the agency China created for the purpose of inspection of fishing vessels. It carries out its inspection and monitoring function on behalf of the government. The main functions of the RFV are to:

- Implement Chinese law and regulations, as well as international agreements;
- Ensure the safety of life and property of the fishers;
- Guarantee that fishing vessels are properly equipped for safe navigation and fishing operation;
- Prevent fishing vessels from polluting the aquatic environment.

Of primary importance in this respect are the Vessel Registration Regulations issued in 1996 and amended in 1997 by the Ministry of Agriculture. Xue (2006) gives a description of this regulation, which is presented in the following. It defines 'fishing vessels' in a broad sense which includes all vessels associated with fishing activities as well as vessels less than 12m, but the registration procedure can be simplified where appropriate for smaller vessels, depending on each provincial fisheries administration. Note that all fishing vessels are required to be registered in order to operate in China.

[26] Two websites (www.cnfc-cn.com and www.cnfc.com.cn) were consulted which appear to present information from different perspectives (Atlantic versus Pacific).

[27] Presumably involves various types such as different size classes of trawlers, supply and freezer vessels, etc.

The Vessel Registration Regulations lay down detailed requirements of fishing vessel registration for ownership and nationality, fishing port, and other legal matters concerning the vessel. The required documents for vessel registration include fishing permit, vessel inspection certificate, and an authorisation from the Bureau of Fisheries of the Ministry of Agriculture. Note that each fishing vessel is only allowed one port of registry (home port).

The authorisation to fish in relation to distant-water fishing is under the direct responsibility of the Ministry of Agriculture, which includes the planning, organisation, and administration of the distant water fishing industry. The Ministry also works with the State Council and other related departments over policy and supervision of the industry. It should also be noted that the Bureau of Fisheries, under the Ministry of Agriculture, has a specific Distant Water Fishing Subdivision.

The China fishing vessel register was recently surveyed as part of a study on the application of unique vessel identifiers and various implementation options in connection with a global record on fishing vessels (MRAG, 2010), being developed by the FAO. Registration of fishing vessels is handled by regional offices responsible for fisheries management such as the Port Supervisory Authority under the Bureau of Fisheries. This registration process appears to be completely separate from the national maritime registration process. It is a highly de-centralised system where the harbour master of the vessel's home port is responsible for the registration of fishing vessel. The processes for vessel registration and authorisation to fish are handled separately, also by local officials. Vessels are required to renew their registration and/or licence every five years.

This study by MRAG (2010) found that in China a wide variety of numbering systems are used in relation to fishing authorisation, which may be the result of various factors: a) different coding systems used in different fishing ports or prefectures; b) formats changing over time; or c) confusion between standardised vessels names (often Roman characters plus a number), assigned vessel registration numbers and registration certificate numbers. In response to this situation, the authorities implemented a new national database, in January 2009, with automatically assigned 16-digit vessels numbers (6 digits for area of registration, 6 digits for construction data and 4 digits for vessel serial number). It thus constitutes a move towards creating a national unique vessel identifier (UVI), a similar development among other countries surveyed. The types of information collected on a vessel basis include: registered owner; address of owner; flag; fishing number (registration number); vessel name; previous vessel name; port of registry; call sign; ship builder; nationality of ship builder; type of vessel; length; moulded depth; GT; and power of main engines.

It was not possible to determine to what extent the Chinese data on vessel registration and authorisation to fish is digitised, but the information collected is relatively complete when considering international requirements on vessel lists (i.e. RFMOs). The most significant items missing are data on vessel operator and address, which are considered essential information in modern fisheries (i.e. reliable information on real or 'beneficial' owners can often be difficult to obtain). The MRAG study found China would need to make only minor adjustments to achieve the required standardised formats to implement unique vessel identifyers, considering the recent proposal by Lloyd's Register-Fairplay (LRF) to the Joint Tuna Regional Fisheries Management Organisations (Kobe II, 2009).

However, these data should be made more readily available, considering international efforts in the fight against IUU fishing. Of crucial importance is the availability of information on operators and beneficial ownership, which will need the involvement of other institutions in China (e.g. tax authorities, financial institutions, etc.). This is, obviously, also applicable to other countries, not only China.

3.4.2 Global record of fishing vessels (GRFV)

In 1993, the FAO concluded the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (commonly referred to as the Compliance Agreement). The primary aim of the Compliance Agreement was to address the increasing global problem of reflagged fishing vessel or vessels which were attempting to escape the jurisdiction (and control) of their flag State (Lugten, 2009). This included provisions relating to the need for, and establishment of, a global record of fishing vessels (GRFV). The call for a GRFV was restated (1999) in the International Plan of Action for the Management of Fishing Capacity.[28] This call occurred again in 2005 in connection with the Ministerially-led Task Force on IUU Fishing on the High Seas, and in the Rome Declaration on IUU Fishing.

In response, a project entitled *Development of a Comprehensive Global Record of Fishing Vessels (GRFV), Refrigerated Transport Vessels and Supply Vessels* was initiated within the FAO and has been supported by subsequent sessions of the FAO Committee on Fisheries. Progress toward an accurate and comprehensive database of high seas fishing vessels has been slow, and it is now widely acknowledged that the HSVAR has not achieved its originally intended purpose. This is attributed to a variety of factors including that it is aimed primarily at vessels longer than 24 m, and that only a limited set of vessel attributes are required. Thus, it was decided that a new and more expansive system would be required.

Considering currently available tools, the Lloyd's database (http://www.lrfairplay.com/) of vessels provides a relatively robust global data set for fishing vessels above 100 gross tonnes (i.e. larger vessels). However, coverage is incomplete for Chinese vessels and the observed data appears to contradict the data reported to FAO by China (World Bank and FAO, 2009). More importantly, this tool does not provide sufficient information to identify and track IUU-listed vessels (Kistowski *et al*., 2010). A unique vessel identifier is a crucial necessity in order to be able to track vessels, as has been called for on numerous occasions (Kobe II, 2009).

Of particular importance in the fight against IUU fishing is the recent adoption by FAO of the Agreement on Port State Measures (www.fao.org/legal/treaties/037s-e.htm) to Prevent, Deter and Eliminate IUU Fishing. This agreement includes effective tools to be used by port States to combat IUU fishing such as the designation of ports where foreign vessels may request entry, the prohibition of entry into port, landing, transhipment and refusal of other port services to IUU fishing vessels, inspections in port, and the adoption of enforcement measures. At present the agreement has 23 signatories but it will enter into force after the deposit of the 25th instrument of ratification or accession. It is widely agreed that port State measures are a useful tool to combat IUU fishing, complementing other existing tools and measures. China should participate in this process, including the implementation of standardised formats for unique vessel identification, thus assisting other countries in bringing IUU fishing under control as part of national, regional and international efforts.

[28] Article 18 in the International Plan of Action states, 'While awaiting the entry into force of the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (Compliance Agreement), States should support the establishment by FAO by the end of 2000 of an international record of fishing vessels operating in the high seas, following the model indicated in the Compliance Agreement'. This came to be known as the High Seas Fishing Vessel Authorisation Record (HSVAR), maintained by the FAO.

3.5 Adjustment measures

3.5.1 The 'zero growth' objective

The capture fisheries sector in China developed steadily from the 1950s to the 1970s and then entered very rapid growth in the 1980s, which resulted in a number of problems linked to overcapacity and overexploitation of resources. In response to this, the Government of China put forward a management objective of 'zero growth' in coastal marine capture catch in 1999, and put forward a plan of 'minus growth' in coastal marine capture catch in 2001.[29] Also, a programme of reducing vessel numbers and relocating fishermen away from marine capture fisheries started in 2002. By the end of 2004, the FAO country fisheries profile indicates that the government had invested nearly US$ 100 million (€82 million), scrapped nearly 8,000 vessels, and relocated over 40,000 fishermen.[30] In November 2003 the Ministry of Agriculture issued further regulations for the control of fishing vessels and set the following quantitative targets:

- Marine fishing vessels to be reduced from 222,000 in 2002 to 192,000 in 2010;
- The total engine power of fishing vessels to be reduced from 12.7 million kW to 11.4 million kW (Guo *et al.*, 2008).

However, there appear to be large discrepancies on the number of fishing vessels in operation (see section 3.1 on the fleet). It would appear that official statistics have reported relatively stable fleet of roughly 280,000 vessels during the 2000s, which indicates that fleet reduction efforts are not working and targets are not being met.

Zheng and Zhou (2005) looked into the issue of fishing capacity, using 1999 as the baseline, and came to the conclusion that the number of vessels should be reduced by 35.2%, gross tonnage should be reduced by 29.8% and the total power by 37.3% in China, if the current marine catch was to stay at the 1999 baseline level. This would correspond to the reduction of the fleet to roughly 160,000 – 180,000 vessels with a total power of 10 million kW, which appears to be the long-term goal (2020) of the Chinese Government according to the Programme of Action on Conservation and Living Aquatic Resources of China, published in 2006.

Since the early 1990s, the fishery management authorities have developed a series of measures, such as "double-control" (control fishing power and intensity), to control fishing efforts and reduce excess fishing capacity. Under the current regulation, however, only a few elements of the country's marine capture fisheries are constrained, e.g. the number of fishing vessels, the types of fishing gear and methods, and the season or area where fishing is allowed. On the other hand access remains free, though within constraints described by Yu and Yu (2008). These authors also suggest that, in the absence of effective reduction of fishing capacity under the existing management system, individual provinces (and individual users) tend to behave as competitors in order to maximize their local interests in the utilization of these resources (called ´local protectionism' in China). Indeed, there are no incentives at local level to achieve national policy goals. In many areas, local officials have granted fishing or boat construction permits to applicants who, had the regulations been implemented, would not have been qualified, to collect fees to supplement their own incomes, and/ or finance the institutions they work for. In other cases, local

[29] … and also in response to the imaginary catch statistics manufactured by lower-level functionaries documented in Pang and Pauly (2001) and Watson and Pauly (2001).

[30] Note that in response to the 'zero growth policy announced in 2008 by the Central Government, China, began in 1999 and continued for a decade to submit to FAO a total catch exactly the same as in 1998, thus documenting the non-independence of its statistical system from political directives – the very point of the paper by Watson and Pauly (2001).

officials have intentionally overlooked the status of vessels lacking licences, as their own political careers benefit from reports of high local 'production'.[31]

Excess fleet capacity and fishing power has been identified as the major impediment towards the effective management of fisheries in China (Cheng *et al*., 2006).

3.5.2 The promotion of distant water fisheries

China regards the development of distant water fisheries a priority (Xue, 2006). To encourage the development of distant water fisheries, China provides preferential treatment through funding allocations and tax policies. Scientific research is also promoted to support distant water fisheries by providing services to the industry in areas including:

- Analysing production trends and market information to distant water fisheries enterprises for decision-making;
- Providing information on the fisheries policies of the world major fishing countries;
- Analysing the requirements of international fisheries instruments on distant water fisheries;
- Analysing fisheries economic development trends; and
- Demonstrating the technical and economic value of distant water fisheries programs.

Despite China now having the largest distant-water fleet in the world, its fleet struggles with a number of problems left over from the 1990s, such as inadequate equipment and lack of technology (Pang and Pauly 2001), as it still consists predominantly of relatively old vessels. (Watson *et al*., 2001). As described by Mallory (2012), China plans to expand its distant-water fishing industry and modernize its fleets through state subsidies. The aim is to "*increase the DWF fleet to 2,300 ships by the end of the twelfth five-year plan (in 2015) for an output of 1.7 million tons at an estimated value of CNY 18 billion (€1.82 billion)… The plan also aimed to improve the quality of fishing operations though quality assurance systems, improved processing (such as a mobile processing sea base), and utilization of ports that are farther away to develop new large-scale fishing operations"*. In order to do so, the State will provide corporate tax relief, reduce import duties or value added taxes, provide subsidies to renovate boats, reduce taxes on import of second hand equipment like ultra-low temperature, trawling, and purse seiner tuna boats, provide subsidies for the development and exploration of new fisheries, and fuel subsidies (Mallory, 2012).

The work of Sumaila *et al.* (2010) on global (including Chinese) subsidies to fisheries suggests that distant-water fishing (and Chinese distant-water fishing in particular) is able to function largely as a result of subsidies. The amount China allocates in the form of subsidies to the fisheries sector was estimated to be about 20 % of the overall value of its reported catch in 2000, or US$ 2.8 billion / €3 billion (see www.seaaroundus.org).

It is interesting to note that a recent study by the U.S. Naval War College (Collins and Grubb, 2008) considers that China has developed a very competitive, fast growing shipbuilding industry. The Chinese Government classifies shipbuilding as a strategic sector and has limited foreign shareholdings to 49%. Production has so far involved low-complexity ships but the industry is now pushing to increase production of "high-value" ships such as very large crude carriers (VLCCs), large container ships, cruise ships and liquefied natural gas (LNG) carriers, as well as large deep-sea fishing vessels. This implies that China may be acquiring a strong position to modernise, restructure and improve its distant-water fleet in the near future.

[31] This was documented in great details in Pang and Pauly (2001) for the 1990s, and clearly had not changed since.

4 CHINA'S IMPORT OF FISH AND FISHERY PRODUCTS

KEY FINDINGS

- China had net exports of fishery products worth US$13.2 billion (3.2 million tonnes) and imports of US$4.5 billion (2.5 million tonnes) in 2010.
- China's main import is whole frozen fish (74% of all imports, about 2 million tonnes/year) which supplies national consumption as well as processing of whitefish fillets for re-export.
- Russia and the USA is the main source of imports reflecting the importance of Pacific whitefish trade (averaging US$1.7 billion 2005 to 2010), accounting for 35% of imports.
- China imported just €213 million from the EU; important products for consumption were Greenland halibut and mackerel; some cod and shrimp are imported for re-processing.

This section reviews China's balance of trade in fishery products (section 4.1), the importance of China as an importing country for human consumption purposes (section 4.2), the main species imported for consumption (section 4.3) and the origin of imported fish, with a particular view on EU countries (section 4.4).

China's trade statistics for fish (and other food/agricultural products) reported in this study should be treated with caution. China does not report separately the re-export of imported fishery products (in other words all exports are assumed to be of Chinese origin). This makes it difficult to distinguish between trade flows for domestic consumption and processing for re-export. Furthermore, a number of important international trading companies, including those in the fishery sector, make use of the Special Administrative Regions of Hong Kong and Macao. Trade by these regions is reported separately, and fishery products exported from these regions are declared as being of SAR origin. This has the effect of under-estimating the true exports from China. Another issue in the interpretation of data is that China's trade data system (which reports trade using the Harmonised System to 6 digits) does not allow us to readily distinguish between products from capture fisheries and aquaculture.

4.1 China's balance of trade in fishery products

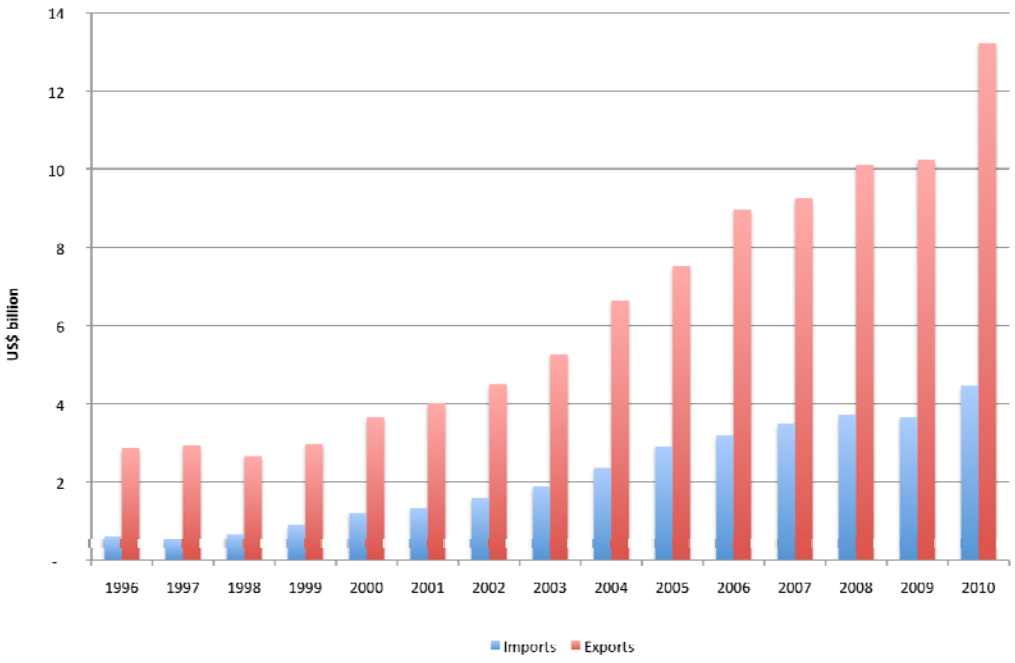
As it is with many other commodities, China is a major trading nation in fishery products. Figure 4.1 shows how exports have risen to US$13.2 billion and imports to US$4.5 billion in 2010 (corresponding to €9.9 billion and €3.3 billion respectively).[32] Not only are both imports and exports of fishery products rising, but also China has an increasing net positive balance of trade, rising from US$3.2 billion in 1996 to US$8.7 billion in 2010 (€1.8 to €6.6 billion) reflecting a disproportionate growth in exports supplied by increased national production (mainly aquaculture). Chinese exports appeared to grow by about 30% from 2009 to 2010 (from US$10.2 billion to US$13.2 billion). Whilst sales to all China's main

[32] All figures quoted include trade in fishery products for human consumption defined as fresh and frozen fish, molluscs and crustacean, as well as prepared and preserved products; i.e. products included within Harmonised System codes 0301 to 0307, 1604 and 1605. This excludes marine mammals and seaweeds, and fishmeal and oils not used for human consumption. The Harmonised Commodity Description and Coding System (HS) of tariff nomenclature is an internationally standardized system of names and numbers for classifying traded products developed and maintained by the World Customs Organisation (WCO)

markets grew, exports to non-traditional emerging markets (such as Africa, Brazil, and Indonesia) grew fastest.

In terms of quantities, in 2010 exports were 3.2 million tonnes and imports 2.5 million tonnes (final product weights). To put these figures into context, China's estimated production in 2008 (live weight basis) was 47.5 million tonnes (of which 32.7 million was derived from aquaculture sources). However this production data may be over-estimated for reasons discussed elsewhere in this report.

Figure 4.1: Chinese imports and exports of fish and fishery products, 1996-2010



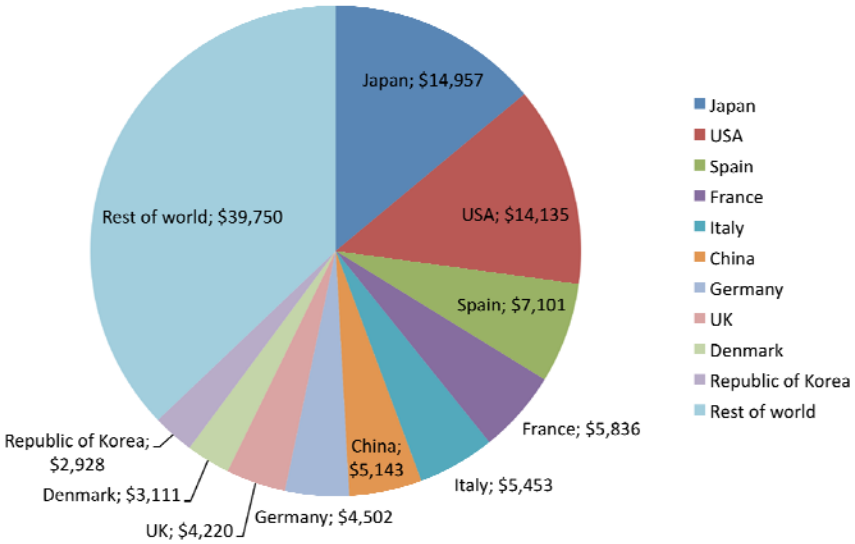
Source: UN COMTRADE database

Over the period 2005 to 2010, about 5% of China's exports were made to the Hong Kong SAR (average US$469 million/year). Trade data reported by UN COMTRADE for Hong Kong indicates that this contributed about 20% of Hong Kong's imports (average US$2.5 billion). Hong Kong does not produce much fish, and imports most of its needs. In this period it has re-exported an average of US$398 million/year, much of which is assumed to originate from mainland China.

4.2 Importance of China as an importing country

Imports of fishery products by China rose from less than half a billion US$ in the 1990's to US$ 4.5 billion (€3.3 billion) in 2010. According to the State of World Fisheries and Aquaculture 2010 report (FAO 2010), Chinese imports peaked in 2008 at US$5.1 billion. This makes China the fourth-largest importer in 2008, after the EU with imports of US$21.6 billion (€15.5 billion), Japan with US$14.9 billion (€10 billion), and USA with US$14.1 billion (€9.5 billion) (Figure 4.2). Of all of the top 10 importing countries China has the highest rate of growth of imports (18% per year).

Figure 4.2: Main global importers of fish and fishery products, 2008 (in US$ million)



Source: FAO (2010)

The growth in imports of fishery products is driven by increasing demand from the domestic market, where the number of middle class consumers has risen considerably (along with new distribution opportunities – see section 6.2). Demand for imports is also driven by the need for raw materials to satisfy export demand, in China's traditional, as well as emerging overseas markets.

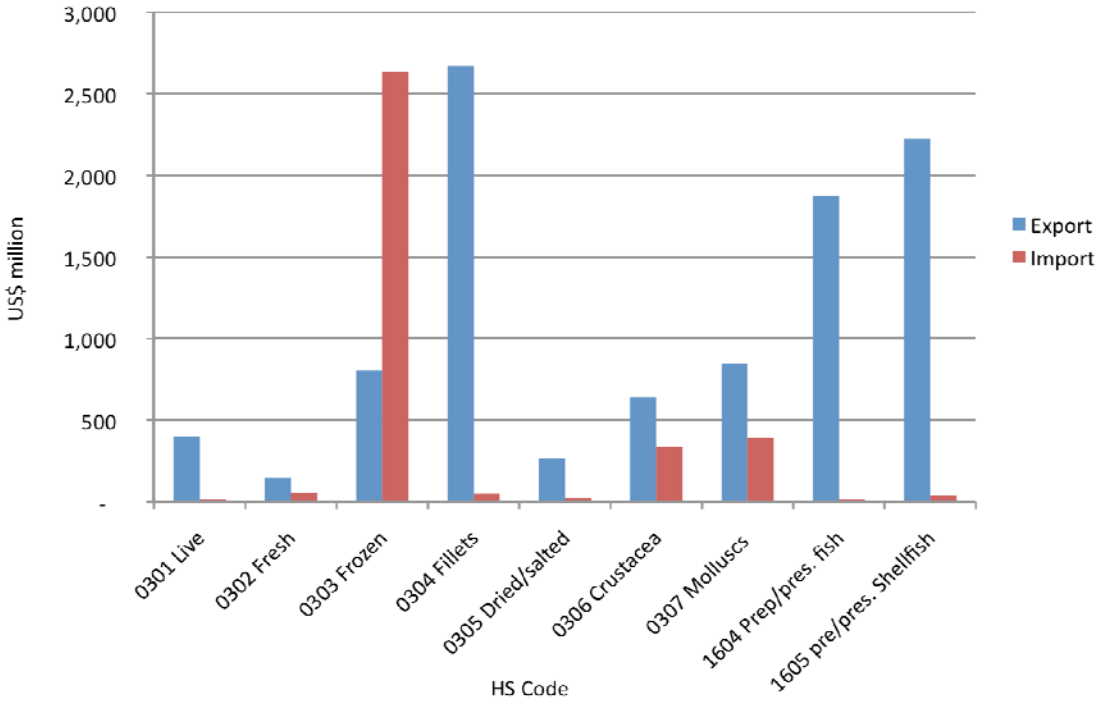
4.3 Main types of fishery products imported

Figure 4.3 shows the value of average imports and exports during the period 2005 to 2010, broken down by the type of products (as defined by the main Harmonised System codes). It shows that China's main import is whole frozen fish with an average about US$2.7 billion/year (about €2 billion), which accounts for about 74% of imports. The quantity imported was about 2 million tonnes in 2007. This reflects the import of sea-frozen fish for domestic consumption (for example small pelagic fish) as well as the import of frozen whitefish for filleting. Frozen crustacean and molluscs are also important, and account for 9.5% and 11% respectively of imports, corresponding to about 200,000 tonnes and 400,000 tonnes respectively in 2010.

4.4 Origins of imported fish

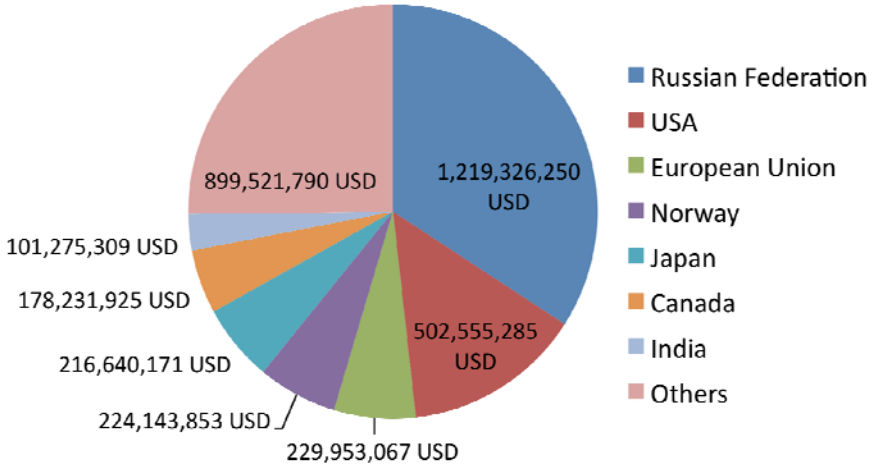
A breakdown of the main sources of imports over the period 2005 to 2010 is shown in Figure 4.4. Imports of fishery products are used to supply China's domestic market, as well as raw material for processing for re-export. The main sources of imports are Russia and USA (about 35% of imports, reflecting the significant level of supplies of Pacific whitefish for processing and re-export). The EU, Norway, and Japan are also important suppliers, which along with Canada and India, account for another quarter of imports. The balance (44%) is supplied from almost all fish producing nations. The pattern of imports, in terms of origin, appears to have been relatively stable over recent years.

Figure 4.3: China's annual import and export of different fish and fishery products, average 2005-2010



Source: United Nations Commodity Trade Statistics Database, http://comtrade.un.org/db/

Figure 4.4: China - main sources of fishery imports, 2005-2010 (million USD)

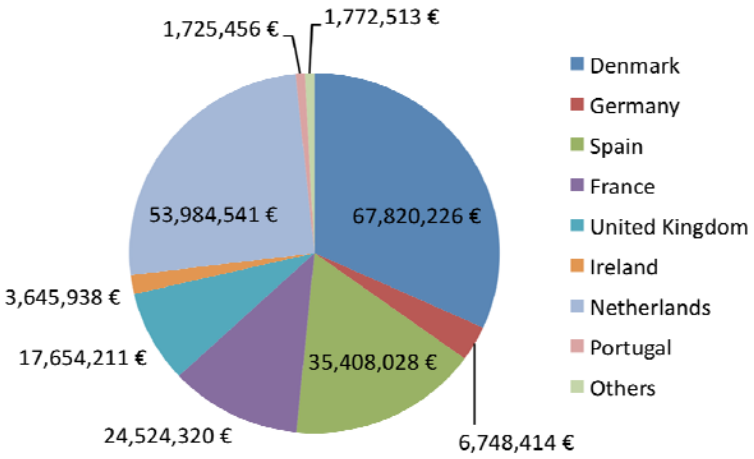


Source: UN COMTRADE Database

According to Eurostat, each year since 2005 China has imported an average of €213 million worth of fish from the EU. Note that this is about €40 million more than indicated by UN data above (the difference is considered to be due to reporting errors and use of different exchange rates).

Figure 4.5 shows the EU Member States of origin of this trade. The pattern of trade has been relatively stable in recent years, with Denmark and Netherlands being the most important sources, accounting for 57% of the EU trade. Spain, France and UK are sources of a further 36% of imports. About 63% of the imports from the EU (average €134 million/year) are of frozen fish. A further 19% (€40 million) are in the form of frozen crustaceans.

Figure 4.5: Average annual value of exports of fishery products from EU to China, 2005-2010



Source: Eurostat

The important European products imported by China for its domestic consumption are frozen Greenland halibut (about €37 million/year from 2005, including the heads, an important byproduct from EU filleting plants) and frozen mackerel (about €11 million/year). The most important products imported from the EU for processing and re-export are shrimp (about €30 million/year which includes the brown shrimp *Crangon crangon*, for peeling and re-export to the EU), and a limited quantity of cod (€18 million/year), also re-exported. Exports of non-specified frozen fish to China (about €52 million/year) may also include some other whitefish species for processing and re-export.

5 CHINA'S EXPORT OF FISH AND FISHERY PRODUCTS

KEY FINDINGS

- With annual growth of 14%, China has become the world's largest exporter of fishery products, with exports of US$13.2 billion in 2010, followed by Norway and the EU.
- China contributes about 10% by weight and 13% by value of global trade in fishery products; this accounts for about 1% of China's visible exports. China's export growth is underpinned by increased sources of supply from US and Russian Pacific whitefish fleets, and increased domestic aquaculture production.
- About one fifth of China's fishery product exports are whitefish fillets (mostly Alaska Pollack and Pacific cod) worth US$2.7 billion (€2 billion) in 2010.
- A recent study found that only 45% of China's cod supplies were from sustainable sources.
- The EU imported €1.5 billion of fishery products from China in 2010, about 6% of all fish consumed. However, China contributed some 54% of Alaska Pollack, and 25% of all whitefish fillets, products used extensively by EU secondary processors.
- Southern EU nations import a wider range of fishery products from China, including molluscs, crustaceans and salted whitefish.
- There are 542 export approved processing factories (of which 294 are authorised for processing of capture products only).
- 90% of factories are located in just five coastal provinces; Shandong Province (main city Qing Dao) and Liaoning Province (main city Dalian) account for 52% of processing establishments.

This section reviews the global role of China in export of fish and fish products (section 5.1), and considers the main markets of destination, both globally and in the EU (section 5.2), taking into account the different sources of raw material (with a focus on the re-processing of imported raw materials). It describes the profile of fishery product exports from China (section 5.3) and finishes by describing some of the most relevant characteristics of the export processing sector (section 5.4).

5.1 The importance of China as an exporter of fish and fishery products

Table 5.1 shows the top ten global exporters and importers of fish and fishery products in 1998 and 2008.

According to FAO State of World Fisheries and Aquaculture (2010) the top three global exporters of fish and fishery products are China, Norway and the EU. Exports by China were US$13.2 billion (€9.9 billion) in 2010, when China is estimated to have contributed about 13% of the global exports of fish and fishery products (about 3.2 million tonnes final product weight).

China's fishery exports are reported to represent about 1% of its visible exports, and the fishery sector therefore makes a small but significant contribution to its overall economic performance (and highly significant to certain fishery dependent regions).

Table 5.1: Top ten exporters of fish and fishery products

Exporters	Exports (US$ million)		Annual growth
	1998	2008	%
China	2,656	10,114	14.3
Norway	3,661	6,937	6.6
Thailand	4,031	6,532	4.9
Denmark	2,898	4,601	4.7
Vietnam	821	4,550	18.7
United States of America	2,400	4,463	6.4
Chile	1,598	3,931	9.4
Canada	2,266	3,706	5.0
Spain	1,529	3,465	8.5
Netherlands	1,365	3,394	9.5
Top Ten subtotal	23,225	51,695	8.3
Rest of the World Total	28,226	50,289	5.9
World Total	51,451	101,983	7.1

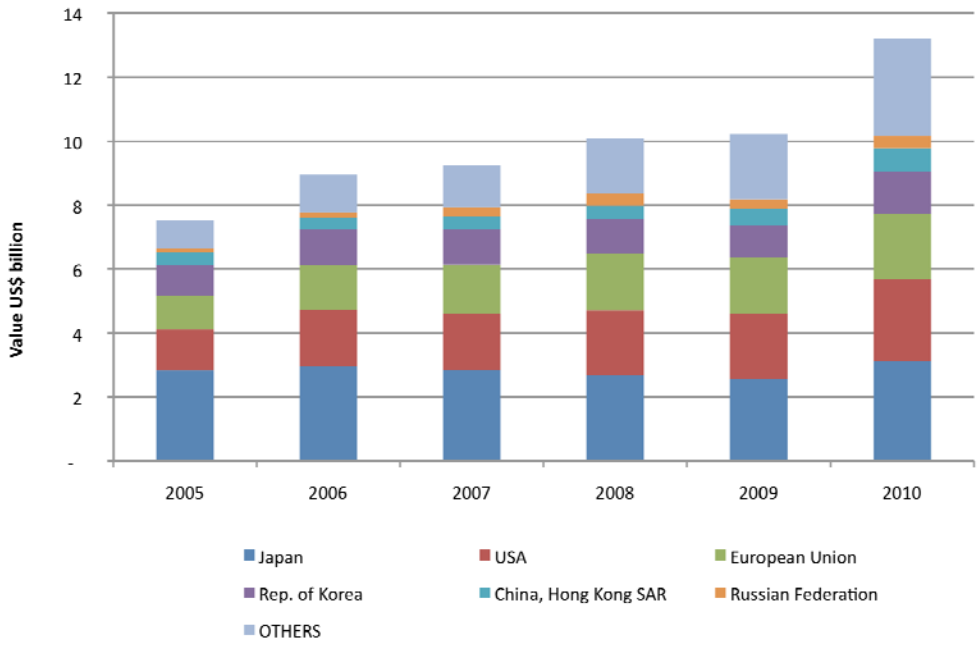
Source: State of World Fisheries and Aquaculture (2010)

5.2 Main destination markets for Chinese export of fish products

Figure 5.1 shows the growth of Chinese fishery product exports, according to different markets. Exports rose from US$7.5 billion (€6.0 billion) in 2005 to US$13.2 billion (€9.9 billion) in 2010. The rate of export growth in fishery products is about 14% per year. China, along with Vietnam, stands out with one of the highest rates of export growth in world fisheries. In both of these countries, the growth of industrial-scale aquaculture production has made a significant contribution to export performance.

The main export markets are Japan, USA, the EU and South Korea. Sales to non-Asian markets (including the US and EU markets) have doubled in 6 years. However the significant jump in 2010 exports shown in the Figure 5.1 appears to be partly due to a significant increase in the penetration of non-traditional developed markets (i.e. the "other" market shown in Figure 5.1 and in particular to other Asian markets). It should also be noted that the Special Autonomous Region of Hong Kong is an important destination, receiving products from China valued at US$0.5 billion in 2010 (€0.4 billion), but much of this product is likely to be re-exported, since Hong Kong is the trading base of several major Chinese fishery sector processing and marketing operations.

Figure 5.1: Chinese exports of fishery products to different markets, 2005-2010



Source: UN COMTRADE Database

Figure 4.3 (in section 4.3) showed the export of different fish and fishery products, indicating that China's main exports during the half decade were in the form of fish fillets (HS code 0304) accounting for an average of US$2.7 billion (€2 billion). The quantities were about 1 million tonnes in 2010 (i.e. about half the volume of whole fish imports). Prepared and preserved fish and shellfish (HS Codes 10604 and 1605) accounted for US$1.9 and US$2.2 billion respectively (about €1.4 and 1.7 billion). Frozen fish, crustaceans and molluscs account for most of the other products exported.

Figure 4.3 demonstrates clearly the major difference in China's import and export profiles, with the emphasis on the import of whole fish, and the export of fillets.

A recent case study of China's whitefish fillet sector (focussing specifically on Atlantic and Pacific cod) found that about 20% of China's supply chain was certified as sustainable, and that another 25% was undergoing certification with the Marine Stewardship Council or similar bodies (Hanson *et al.*, 2011). The study expressed concern regarding the sustainability of the remaining cod supplies, as well as the Alaskan Pollack fisheries on which this trade draws. Hanson *et al.* (2011) also mentioned the difficulties in ensuring traceability to origin, linked to the issue of correct identification of imported species (since mis-declarations are frequent, especially in the case of products of IUU fishing, such as illegally caught Patagonian toothfish *Dissostichus eleginoides*).

China also exports significant quantities of canned (and otherwise preserved) fishery products, and supplies almost every country in the world. The main destinations of preserved fishery products are Japan, USA, Russia and SE Asian countries; the main destinations of preserved crustaceans and molluscs are Japan, USA and other Asian countries.

5.3 Exports of fishery products from China to the EU

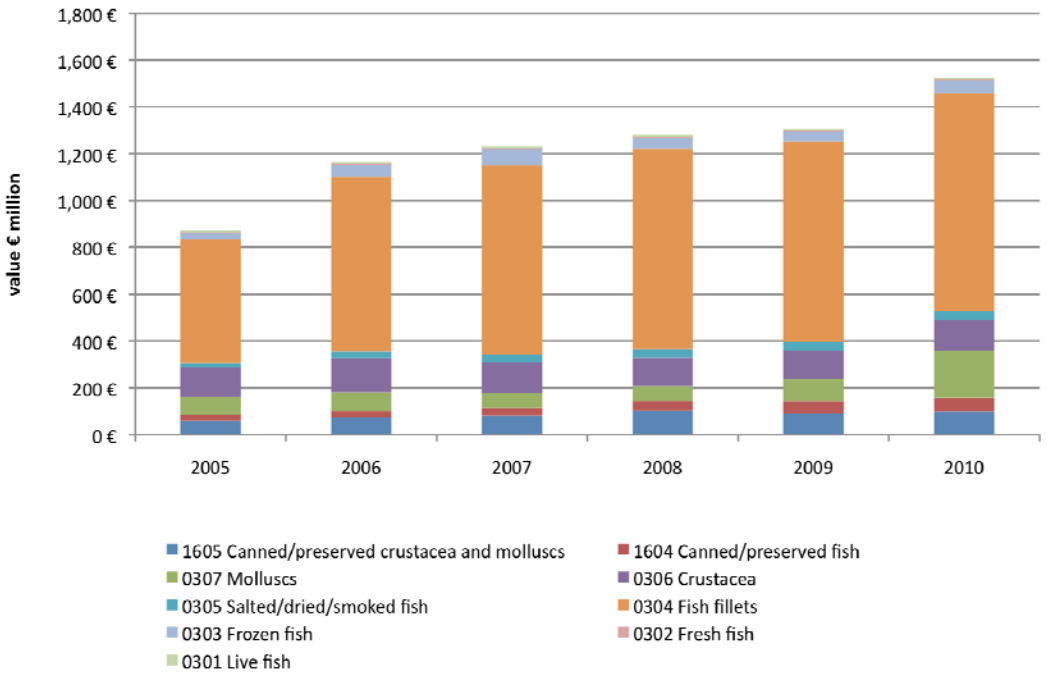
According to EUROSTAT, the EU imported €1.5 billion worth of fish and fishery products from China in 2010, up from just under €900 million in 2005. These imports contributed about 10% of EU imports of fishery products and about 6% of consumption. Figure 5.2 shows that, on average, fish fillets accounted for the majority of the imports (about 64%), and crustacean and molluscs for another 20%.

The main EU markets for Chinese fishery products are Germany, Spain, UK and Netherlands, as indicated in Figure 5.3. This also shows interesting differences in consumption patterns, with northern EU countries importing mainly whitefish fillets (HS Code 0304) and southern countries importing a much wider range of fishery products, including molluscs and crustacea. It is interesting to note the doubling of the import of molluscs from China in 2010, with most of this increase taken by Spain and Italy (in terms of cuttlefish, squid, and similar cephalopod molluscs).

In September 2009 a mission by the Food and Veterinary office of DG SANCO inspected China's sanitary controls on the production and marketing of bivalve molluscs, but found it not compliant with EU requirements in numerous respects (see Table 6.2). Therefore at present there are no bivalves, or gastropod molluscs (or similar products such as sea urchins) imported by EU Member States (although some scallop meat is permitted subject to certain conditions). Once these compliance issues are resolved, it is expected that there will be a significant increase in trade in relation to these products.

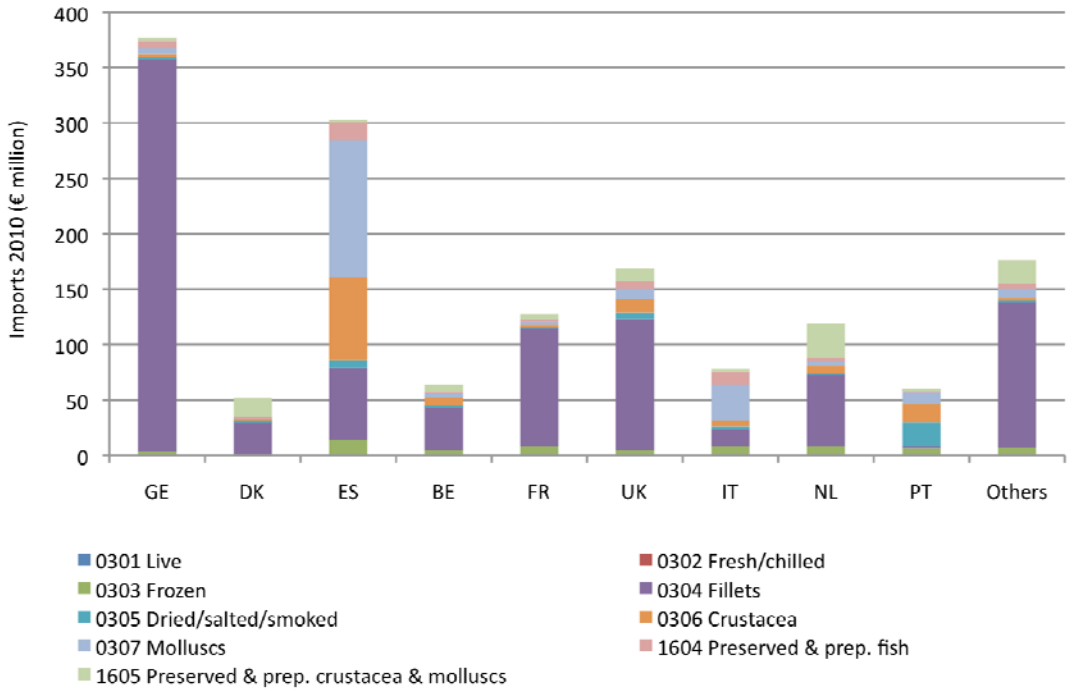
The figure also shows how China has become an important supplier of salted cod (*bacalhau*) to the Portuguese market.

Figure 5.2: Imports by the EU of fishery products from China, 2005-2010



Source: Eurostat

Figure 5.3: Imports of fishery products from China by EU Member States, 2010



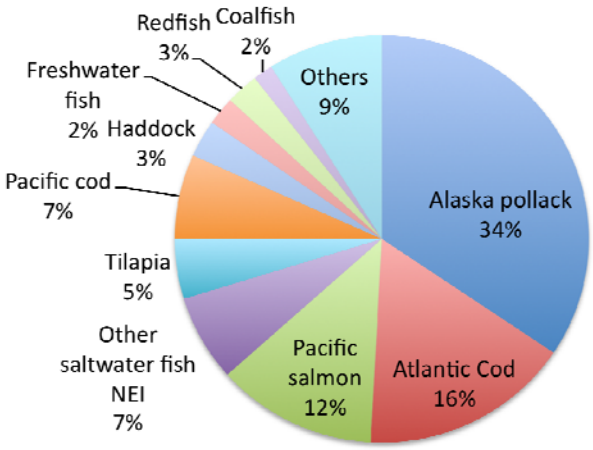
Source: Eurostat

A more detailed breakdown of the EU's import of fish fillets from China in Figure 5.4 confirms the importance of whitefish fillets. It shows that about 40% of the imports are of just two species, Alaskan Pollack (*Theragra chalcogramma*) and Pacific Cod (*Gadus macrocephalus*) which are sourced mostly from US and Russian vessels. A further 16% of EU fillet imports from China are Atlantic cod (*Gadus morhua*) usually of Norwegian or Russian (i.e. Barents Sea) origin, with some product from Iceland, all processed in factories in China.

The EU Fish Processors and Traders Association reports that the marine whitefish fillet sector is one of the EU's most import dependent fishery sectors, with 89% dependency on imports (AIPCE CEP Finfish Study, 2011). All of the EU's Alaskan Pollack is imported (corresponding to about 710,000 tonnes live weight in 2010). China accounts for 54% of the supplies of this species, and about 25% of import of the overall volume of whitefish fillets. Although the quantities are down from about 36% in 2008, when fish imports by the EU peaked, the EU remains dependent on imports of fishery products from China to ensure continuity of supply to the market in relation to these product categories. Note that although almost all of these products are first imported by China from other sources and then re-exported, they are always declared as being of Chinese origin.

All of these products are used extensively in frozen convenience products and in catering. Only a small proportion of exported fillets from China are derived from aquaculture (mainly tilapia and other freshwater fish). The export of whitefish is therefore mostly driven by imported raw materials, reflecting China's rise as a fish processing platform for fish caught by other fleets around the globe.

Figure 5.4: EU imports of fish fillets from China, 2010



Source: Eurostat

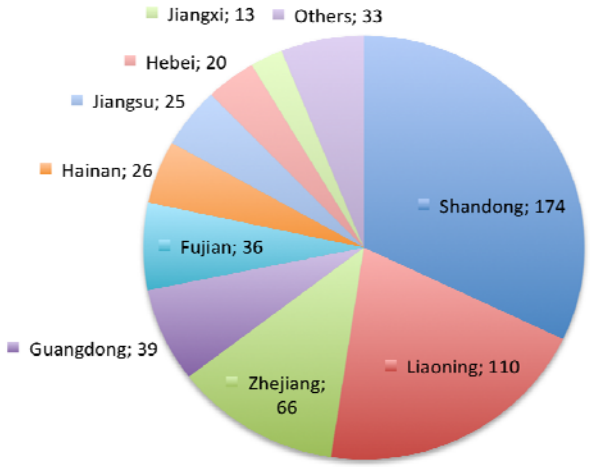
5.4 The characteristics and localisation of fish processing industry

The rise of China as an industrial and manufacturing platform is reflected in the rapid development of the fish processing sector. There is a significant cost and quality advantage to hand filleting in China. Compared to mechanical processing, filleting by hand delivers both a superior yield and a better quality of product. Filleting by hand, in the EU for example, is significantly more costly. These factors, combined with the fall of international freight costs, have made the processing and re-export of imported raw material an economic proposition for Chinese operators. It also suggests that China's future trading position may be sensitive to rising labour costs.

According to DG SANCO of the European Commission, in August 2011 there were 718 processing establishments, freezer vessels and factory vessels, approved by the Competent Authority for export to the EU. These included 542 processing factories (of which 294 were authorised for processing of capture products only - the balance process aquaculture products as well as products from capture fisheries). Whilst there are more than 542 fish processing establishments in China, this number includes the largest and all of those linked to substantial international trade flows. In addition, 168 freezer vessels and 7 factory vessels are also approved, although this represents only a small fraction of the Chinese industrial fleet.

Almost 90% of the processing activities are in located in the five coastal provinces of Shandong, Liaoning, Zhejiang, Fujian and Guangdong (or in their main cities). Shandong Province (main city Qing Dao), with 171 establishments, and Liaoning Province (main city Dalian), with 109 processing establishments) are the epicentre of China's fish processing industry, accounting for 52% of processing capacity by number of establishments (Figure 5.5).

Figure 5.5: Fish Processing Plants in China



Source: DG SANCO, European Commission

There is a high degree of concentration in this sector, with the emergence of a number of major operators. Pacific Andes and the Homey Group are two of the largest operators typical of the segment.

Pacific Andes was established 1986 and is quoted on the Hong Kong stock exchange. It operates over 20 international-standard processing facilities across China, Japan and the United States, producing a diverse range of fishery products. The company pioneered the processing of Alaska Pollack sourced from the Russian fleet operating out of Vladivostok and operates its own reefer transport fleet. In 2004, Pacific Andes International Holdings acquired a strategic stake in China Fishery Group Limited, which signalled the Group's extension into industrial fishing activities targeting whitefish in the North Pacific and fishmeal species in the South Pacific. Another recent investment is its Hongdao processing complex in Qingdao, which began operations in February 2009. This includes what is claimed to be the world's largest fish processing facility. Group revenues were HK$11,471 million (€1.1 billion) in 2010. Source: Annual Report 2011, Pacific Andes International Holdings Ltd (www.pacificandes.com).

The Homey Group was established in 1978, located in Shandong. Business activities range from food and fish processing, aquaculture, fishing and transportation, manufacturing, as well as agriculture, finance and tourism industry. The Group owns more than 50 subsidiary companies with over 12,000 employees, 18 of these subsidiaries are food-processing plants. The company is listed on the Shanghai stock exchange. Homey possesses over 40 fishing vessels (fishing capacity about 70,000 tons per year), 13 transport vessels, about 3,000 hectares of aquaculture production. Products are fresh and frozen seafood, as well as vegetable, meat and pastry products, which are exported globally. Total assets employed were RMB 3.8 billion (€365 million in 2007) and sales revenues were reported as US$280 million (€205 million). Source: www.homeygroup.com

6 EVOLUTION OF THE CHINESE MARKET FOR FISH AND FISHERY PRODUCTS

KEY FINDINGS

- China contributes about one fifth of the world population and its consumption accounts for about a quarter of global demand for fish.
- Fish consumption has more than doubled over the last 20 years to around 27 to 32 kg/capita/year, but per capita consumption appears to have reached a limit.
- About 40% of consumption is from aquaculture and much of the growth in consumption is attributed to increased supplies from aquaculture, including carp.
- Future growth in fish consumption in China will be driven by growth in population rather than per capita consumption; it is likely to be mainly supplied from aquaculture, and is not likely to impact strongly on those EU supply chains which depend on China as a source (e.g. for whitefish fillets).
- Regular food safety scandals have plagued the Chinese food industry in recent years, undermining confidence in the sector and government's control institutions.
- The fishery sector is not immune to food safety risks; during 2006 to 2011, EU Member States and the Commission issued 335 Rapid Alert notices with regard to Chinese fishery products which did not comply with EU food safety standards. About half were in relation to use of illegal chemicals in aquaculture and additives in processing.
- However recent findings from missions of DG SANCO Food and Veterinary Office show significant improvements in the control system for veterinary medicines.
- Nevertheless longer term food safety concerns remain in relation to bivalve molluscs and ensuring supplies are derived from authorised freezer vessels (including those flagged by other third countries).

This section reviews the evolution of the Chinese fish market in terms of fish consumption (section 6.1) and considers the main drivers of domestic consumption and projections for the future (section 6.2), considering the impact on the EU supply chain. It also sets out the important issues of food safety in China and describes some of the current issues regarding the safety of fishery products produced or processed in China (section 6.3).

6.1 Evolution of the Chinese fish market

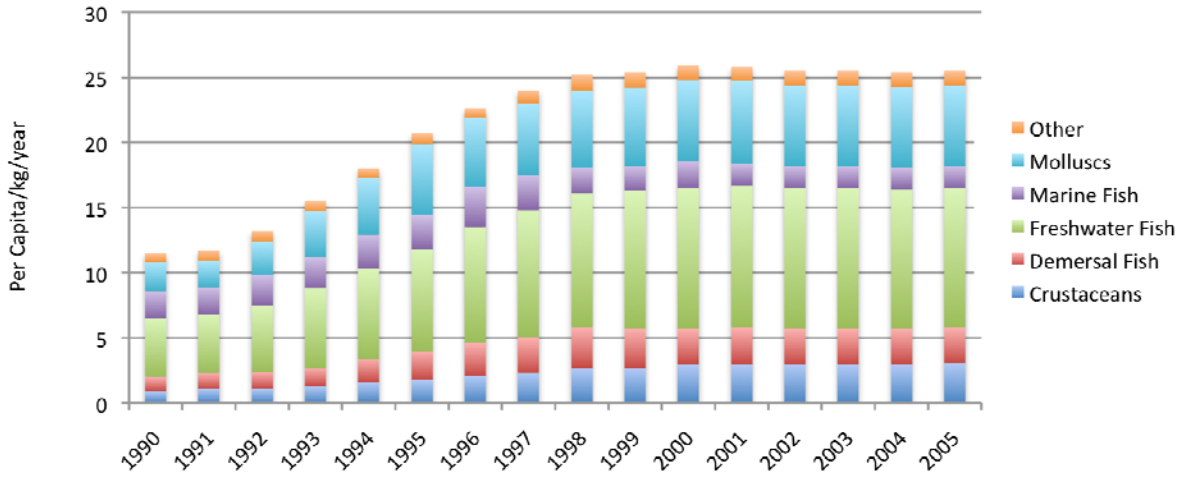
As well as being a major trading nation, China is an important consumer of fishery products in its own right. The FAO State of World Fisheries and Aquaculture (2010) has reported that seafood consumption in China was about 32 kg per capita in 2009. This level of per capita consumption is based on an estimated supply (production less non-food uses and trade balance) of about 42 million tonnes. However these estimates may be rather optimistic. As noted elsewhere in this report production estimates may over-estimate the actual situation, even after China's 2006 statistical adjustment.[33] It is also notoriously difficult to determine the distribution of small pelagic between catches destined for human and non-human uses. A slightly more modest estimate, produced in the report by Glitnir Bank in 2007, suggests a

[33] These adjustments, which may be seen as a delayed response to the over-reporting of domestic marine catches documented in Watson and Pauly (2001) were cosmetic, and did not address the fundamentally improbable level of caches, fixed since the promulgation of the "zero growth" policy, in 1998.

consumption level about 10% lower and is shown in Figure 6.1. Whatever the actual level, it is clear that fish consumption has more than doubled since 1990, when it was estimated to be about 11.5 kg per person. It is also evident from Figure 6.1 that per capita consumption of fish appears to have reached a plateau after with little change after the significant increase during the 1990s.

The global average fish consumption reported by FAO was 17.1 kg/capita in 2008, although this figure is distorted by China's high population. Without China, average per capita global fish consumption in 2007 was about 14.6 kg, only slightly higher than the average values of the mid-1990s. Most of the global increase in per capita consumption can therefore be attributed to the apparent growth in domestic consumption in China, owing to the substantial increase in its fish production, mainly from the growth of aquaculture. Since China contributes about one fifth of the world population, China's consumption patterns have a major impact on global demand for fish.

Figure 6.1: Breakdown of seafood consumption in China, 1990-2005



Source: FAO data, reported by Glitnir Bank (2007)

6.2 Drivers and impacts of changing fish consumption in China

Generally in low income countries, growth in GDP per capita is highly correlated to increased fish consumption. There are a number of projections for the increase of the size of the middle class in China. In 2006 the size of the middle class (depending on definition) ranged from 100 million to 247 million, and it is forecast to grow to 650 million in 2015 and 1.5 billion or more by 2035 (Glitnir Bank, 2007). There are also significant parallel developments in the domestic distribution of fishery products in China, with a decline of traditional channels through fresh fish markets, and increasing sales of fresh and processed fish through supermarkets. The growing number of foreign retailers operating in China is providing opportunities to penetrate the market with processed and packaged products. Carrefour (France), Jusco (Japan), Metro (Germany), and Wal-Mart (USA) are the largest foreign supermarket chains operating in China at present, with some domestic retailers such as Wu-Mart also growing quickly (with more than 1,000 outlets in northern China).

Therefore projections regarding the rapid expansion of the middle class in China, and increasing availability of fish products through supermarkets lead to the forecast that fish consumption will continue to increase rapidly. A frequently quoted projection of 35.9 kg/per capita in 2020 was proposed in the 2007 study undertaken by Glitnir Bank (2007).

However, it is a fact that if consumption were to reach around 30kg/capita, along with a projected population growth to an estimated peak of about 1.5 billion somewhere between 2030 and 2040, to keep pace with demand, the supplies of fish to the Chinese market would need to rise to about 45 million tonnes (from the current, possibly excessive, estimate of 42 million tonnes).

However, these projections may over-state the case. As noted, continuing doubts regarding the validity of catch and trade data (especially re-export of imported products) undermine the reliability of supply calculations, and the resulting consumption estimates. More recent research on food consumption patterns shows that changes in the income of middle class consumers impact less on fish consumption as a wider variety of foods become available; in economic terms, the income elasticity of demand decreases with increasing incomes. A recent OECD paper (Abler, 2010) has therefore questioned the validity of direct extrapolations as a way of predicting food consumption patterns. As seen in Figure 6.1 there is clear levelling off of per capita fish consumption since 1998, as consumers are apparently exposed to diversified range of foodstuffs.

Figure 6.1 shows that although consumption of all categories of fish has increased, most of the increase has been supplied by aquaculture products. One of the most consumed aquaculture products are the several species of freshwater fish which fall within the carp group. These are not traded internationally. As a result much of growth in consumption has had little impact on international trade. From the point of view of trading partners, the main question, therefore, is whether growth in sustainable supplies from aquaculture (either nationally produced or imports, such as *Pangasius* from Vietnam) can be increased to avoid a significant distortion of China's current trade patterns (for example by diverting supplies from export to domestic consumption, or by increasing competition for imports from other supplying countries). The EU's main dependency with regard to China is in relation to supplies of whitefish fillets. China is not a major direct consumer of these products, or of the species which are used to produce them (principally Pacific cod and Alaska Pollack).

Overall, continued growth in fish consumption in China is likely to be modest, and driven by growth in population rather than per capita consumption. Furthermore growth in consumption is almost certainly likely to be mainly supplied from aquaculture, and is not considered to be likely to impact strongly on the most dependent EU supply chains (e.g. for whitefish fillets) which depend on China as a source.

6.3 Food safety concerns

6.3.1 Food safety issues

Rapid industrialisation of China's agricultural and food industry appears to have outpaced the development of the food safety control system; along with extensive use of agro chemicals (pesticides, veterinary medicine) and processing additives this has contributed to a number of well publicised food safety scandals[34].

[34] Some examples reported widely in the press (Gale and Buzby, 2009) in recent years are:

- Pork meat contaminated with banned substances (growth promoting steroids);
- Animal feed, skimmed milk and infant formula contaminated with melanin;
- Watermelons treated with growth hormone;
- Vinegar contaminated with antifreeze;
- Illegal colours used in steamed buns.

More specifically, in relation to fishery products, official control bodies in importing countries regularly find unsafe products imported from China which contravene food safety regulations. Table 6.1 shows the Rapid Alert System for Food and Feed (RASFF) notifications issued by DG SANCO during the 6 year period 2006 to 2011 indicating problems detected in 56 consignments annually of fishery products imported from China. Nearly half of the alert notices continue to be in relation the use of illegal treatments (including veterinary drugs in aquaculture, use of illegal additives). In this respect, China is similar to other aquaculture exporters in the region (Vietnam, Indonesia) who have also struggled to control residues of veterinary medicines in their products, especially in the face of increasingly strict sanitary measures imposed by importing countries. US Food and Drug Administration data (Gale and Buzby, 2009) shows similar findings.

Figure 6.2 shows the evolution of the RASFF notifications over time, with a record 54 notifications in 2007 (mostly illegal veterinary medicines in fish and crustaceans from aquaculture). Since this time, it appears that there have been significant improvements (with relatively fewer alerts in subsequent years, even as trade volumes have increased). However there is also a notable increase in alerts concerning cephalopod molluscs (mostly in relation to compliance with EU heavy metal limits).

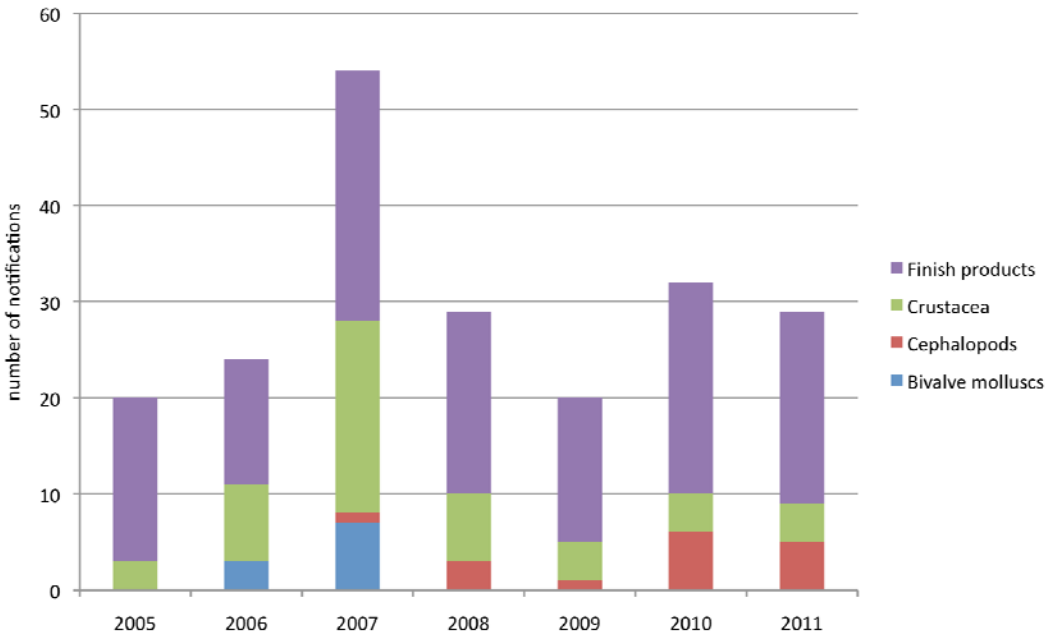
Table 6.1: Summary of the main reasons for notifications by the Rapid Alert System for Food and Feed

Reason	Notifications 2006 to 2011	
	No.	%
Illegal veterinary drugs	105	31
Heavy metals	16	5
Spoilage/poor hygiene	23	7
Bacterial contamination	38	11
Illegal chemical treatments	54	16
Parasites	14	4
Documentary, fraud and labelling	42	13
Others	43	13
TOTAL	335	100

Source: DG SANCO, European Commission

It is interesting to note that most of the scandals involve cases of deliberate adulteration. The melamine case is instructive. China's food safety control system relies substantially on end product specifications (rather than the greater emphasis placed on controls along the supply chain, as in the EU). Many products have minimum protein contents specified. Melamine is high in nitrogen and can be used as an adulterant to elevate the total nitrogen, and therefore the apparent protein content. In 2007, in the US, pet food and animal feed ingredients of Chinese origin were found be contaminated with melamine. In China, in 2008 nearly 300,000 people were poisoned, with more than 50,000 infant hospitalizations and six infant deaths, caused by melamine adulterated milk and infant formula. On January 22, 2009, three of those involved in the scandal were sentenced to death. Actions taken since 2008 by the Government of China have reduced the practice of adulteration, but studies show that the authorities are still not fully in control of the problem.

Table 6.2: DG SANCO Rapid Alert Notifications in Chinese Fishery Products, 2005 to 2011



Source: DG SANCO, European Commission

6.3.2 Food safety controls

These examples of non-compliance have undermined confidence in China's food industry and the capacity of Government to design and implement effective controls. The Central Competent Authority responsible for overseeing food safety and quality conditions of fishery imports and exports at the national and local levels is the General Administration of Quality Supervision, Inspection and Quarantine (GAQSIC) of China which operates through a series of provincial services and the Entry Exit Inspection and Quarantine Bureaus (CIQs). There are 19 departments under GAQSIQ, and food safety issues fall under the Department of Supervision on Animal and Plant Quarantine, the Bureau of Import and Export Food Safety, and the Department of Supervision of Food Production. The GAQSIQ was made a Ministry in 2001.

However no single agency in China is responsible for all food safety regulations and enforcement, and the departments' duties often overlap. The GAQSIQ is only one of approximately ten government departments and ministries under the State Council which monitor food safety in China. Others include the Ministry of Health, the State Drug Administration, the Ministry of Agriculture, the State Administration for Industry and Commerce, the Ministry of Commerce, the Ministry of Science and Technology, and the National Institute of Nutrition and Food Safety. There are also local and regional food safety agencies, but there is no legally established hierarchy of agencies at the local or national levels.

In response to this complexity of multiple agencies concerned with food safety, the National People's Congress established the State Food and Drug Administration in 2003, to coordinate all aspects of food safety regulation and unify the systems of official control. However, other agencies have continued to operate and as the melamine problem and ongoing import alerts in the EU and US show, fraudulent practices and weak food safety controls remain a major concern.

6.3.3 DG SANCO Inspection missions

The nomination of the Competent Authority for fishery product exports to the EU was recognised by the European Commission in Commission Decision 2005 572 EC of 19 July 2005 amending Decision 2000/86/EC laying down special conditions governing imports of fishery products originating in China.

The most recent inspection missions undertaken by DG SANCO were in 2009, which reviewed in detail different aspects of the control systems for fish and fishery products (including for aquaculture products, bivalve molluscs and for farmed products of animal origin in relation to controls of veterinary medicines). The results of these inspections are shown in Table 6.2.

Table 6.3: Results of DG SANCO inspection missions in 2009

Title	Summary
Final Report of a mission carried out in China from 05 May to 15 May 2009 in order to evaluate the control systems in place governing the production of wild and farmed fishery products intended for export to the European Union	The system of controls operated by the General Administration of Quality Supervision and Inspection (the central CA) was found to be satisfactory in many aspects. However the controls in relation to inspection and listing of approved freezer and factory vessels and certification of products from them were inadequate. Also the mission found that there were no adequate controls on imported raw and semi-processed materials for re-processing for export to the EU, and that approved establishments were supplied with raw material from non-approved domestic sources. The mission concluded that China has not yet achieved full equivalence with EC requirements.
Final Report of a mission carried out in China from 07 to 11 September 2009 in order to evaluate the control systems in place governing the production of bivalve molluscs intended for export to the European Union	Assessed the conditions for a new supply of scallops from the Zhangsi Dao production areas to the EU market. The mission found that different laboratories analysing for the same parameters used different methods and approaches to quality control. The classification system for harvesting areas for bivalve molluscs was not based on Community legislation. There was no national monitoring system in place for toxic phytoplankton; although monitoring was conducted on a regional basis, the sampling method was not appropriate and no action was taken on the basis of non-compliant results. Monitoring of DSP and PSP toxins was appropriate, but ASP toxin was not monitored. Overall the newly established control system could not be considered equivalent to EU requirements.
Final Report of a Mission Carried Out in China From 26 October to 05 November 2009 in Order to Evaluate the Control of Residues and Contaminants in Live Animals and Animal Products, Including Controls on Veterinary Medicinal Products	The mission reviewed the control of residues and contaminants in live animals and animal products, including the controls on the distribution and use of veterinary medicinal products and feed additives and residue monitoring. The Chinese competent authorities were found to operate a comprehensive control system for residues in food of animal origin and the use of veterinary medicinal products in food producing animals. This system is underpinned by a network of well equipped laboratories, well defined quality control standards and, in the case of the export establishments, comprehensive own-checks which are complemented by strict supervision by the competent authorities. Some shortcomings were identified in relation to the follow-up of non-compliant results and incomplete validation of some analytical methods. However it was concluded that the current control system for residues in food of animal origin and the guarantees provided by this system can in general be considered to be equivalent to those provided for by Community legislation.

With regard to aquaculture products and the controls on veterinary medicines, DG SANCO has indicated that it considers the situation to be much improved over the last few years, as indicated by the findings of the November 2009 mission and RASFF data. In relation to bivalve molluscs the European Commission has decided to continue disallowing the imports into the EU of these (and similar) species, and their products. Subsequent to the September 2009 Food and Veterinary Office (FVO) mission on bivalves, China submitted a plan of corrective actions, subsequently accepted by the Commission, and when this is fully implemented, expects to request DG SANCO to consider once again its compliance with the EU requirements. With regard to other fishery products, the Commission's main concern remains the deficiencies in the traceability of imported raw material and ensuring that it originates in a country and freezer vessels authorised to supply the EU market. Thus, in summary, strengthened control of the supply chain for imports and full implementation of food safety controls for bivalves remain as the major concerns regarding food safety condition of Chinese fishery products. The Food and Veterinary Office expects to visit China once again during 2012 to follow up on these issues and check on progress with implementation of action plans.

In the meanwhile the EC has signed a Memorandum of Understanding with China on SPS issues. This includes the provision of technical assistance under the EU China Trade Project (http://www.euctp.org). DG SANCO expects to be able to apply this provision to help strengthen further the development food safety control systems in China (interview with the Head of Unit of Food Safety and Sanitary and Phytosanitary (SPS) issues, Bilateral International relations).

7 FISHERIES AGREEMENTS

KEY FINDINGS

- China is slowly, although progressively, joining international agreements.
- The main challenges are frequent opposition to any changes on IUU rules, and the difficulty to identify China's actual position on specific issues (e.g. Port State Measures).
- China's cooperation track record in RFMOs has significantly improved in the last years (e.g. higher level of cooperation with EU initiatives), mainly driven by China's commercial interest. China is now member of all the tuna RFMOs.
- Outstanding issues regarding RFMOs include the increasing difficulty to negotiate quotas given China's growth of fishing capacity, and China's veto to Taiwanese participation in IOTC.
- The nature of China's fisheries agreements vary from state-to-state bilateral agreements to non-governmental arrangements between parastatal / public-private partnerships and the third country.
- In any case, China's fisheries agreements are characterised by a lack of transparency and, quite often, controversial content.
- China's presence in West Africa and South America is raising growing concern for its impact on the economy and environment of the host country. Stakeholder feedback indicates that IUU activities are the main cause for these perceptions.
- China's fisheries agreements are usually linked to loans and aid projects. This fosters the dependency for the third country, limits its freedom of action and becomes an obstacle in the fight against IUU.
- EU stakeholders are concerned over China's approach to secure agreements, essentially based on offering whatever is demanded to secure their supply, as they believe this is resulting in tougher negotiations of fisheries agreements for the EU.

The fishing grounds of Chinese distant-water fleet activities, according to the FAO country fisheries profile, include the high seas of the Pacific Ocean, Atlantic Ocean and Indian Ocean, and the jurisdiction zones of 35 countries. However, our research has also documented the occurrence of Chinese fishing vessels in the EEZ of 79 countries as of March 2012 (see section 2.3).

This section presents the activities of the distant water Chinese-flagged vessels on the high seas (section 7.1), and the activities of Chinese fishing fleets in the EEZ of third countries, based on governmental and non-governmental fisheries agreements (section 7.2).

7.1 Activities of the distant water Chinese-flagged vessels on the high seas

UNCLOS defines high seas as '*... all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State*' (UNCLOS, Part VII. High Seas. Section 1 General Provisions, Article 86).

7.1.1 Adoption of international agreements / instruments

China has substantially developed its fisheries sector over the last decades and there are growing concerns over the means deployed to achieve this as well as level of compliance with international standards.

Our research and stakeholder feedback indicate significant progress in the last years to comply with international standards, for example through modernisation of China's distant-water fleet in the International Commission for the Conservation of Atlantic Tunas (ICCAT) and Indian Ocean Tuna Commission (IOTC) areas. However, according to DG MARE feedback, other issues (addressed in earlier sections of this report) are still pending (e.g. pirate fishing, sanitary and social conditions on board…).

China is portrayed as an active member in many international fishery related organisations, and overall, it is considered to have demonstrated a good level of cooperation in the framework of existing international instruments (Mallory, 2012).

However, there are some remaining challenges for China in relation to ratification of international agreements. An example of these follows next:

- The 1995 Fish Stocks Agreement "*deals with highly migratory and straddling fish stocks. China has signed but not ratified this agreement because it disagrees with the understandings of enforcement authorization and use of force during inspections of fishing vessels by authorities other than the flag state*".[35] It is worth noting that despite of this disagreement, China is member of most of the RFMOs that deal with migratory fish stocks (see next section 7.1.4);
- The 1995 Compliance Agreement "*requires flag states to license high seas fishing vessels; monitor vessels fishing on the high seas so that they act in accordance with sustainable fishing practices; not allow authorization of vessels that act in violation of conservation measures; and share relevant vessel information with the FAO. China has signed but not ratified this agreement*";[36]
- The 1995 Code of Conduct for Responsible Fisheries is "*a non-binding agreement that lays out guidelines for the sustainable and responsible use of fisheries*".[37] According to recent research, China ranks 22nd out of 53 countries ahead of other DWF powers such as Spain and Russia but behind the United States, Japan, and South Korea (Pitcher *et al.* 2008, 2009).[38] Furthermore, this research reveals that

[35] The Agreement was adopted on 4 August 1995 by the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks and opened for signature on 4 December 1995. It remained open for signature until 4 December 1996 and was signed by 59 States and entities. [http://www.un.org/depts/los/convention_agreements/convention_overview_fish_stocks.htm]. Mallory (2012) mentions that many of these agreements [subsequent to UNCLO] have important implications for DWF nations.

[36] The Agreement to Promote Compliance with International Conservations and Management Measures by Fishing Vessels on the High Seas, signed 1995, entered into force on 24 April 2003, http://www.fao.org/docrep/meeting/003/x3130m/X3130E00.HTM

[37] The Code of Conduct for Responsible Fisheries (CCRF), adopted by the FAO on 31 October 1995, http://www.fao.org/docrep/005/v9878e/v9878e00.HTM.

[38] Mallory (2012) cites the studies of Pitcher *et al*. (2008) and Pitcher *et al*. (2009) and that they mention areas where compliance with the FAO Code of Conduct of Fisheries is deficient. The first three areas "*measure intentions to comply with the code, rating a country's balance of conservation and economic aims; its stated management targets; and its use of precaution when expanding fisheries and establishing no-take zones. The remaining questions deal with the effectiveness of day-to-day compliance, including the rigorous use of quantitative reference points, minimizing wasteful discard, by-catch and impact on habitats such as coral reefs; socio-economic factors such as maintaining beneficial small-scale fisheries and coastal communities; and the control of illegal fishing and flags of convenience', when ships are registered in countries other than those where they are owned in order to evade regulation*".

China is good on intentions but fails on actions, and also that its domestic fleet is better regulated than its distant-water fleet;[39]

- The 2001 Plan of Action on IUU Fishing is a '*non-binding agreement that addresses IUU fishing. The Plan was followed in 2009 by a binding Port State Measures Agreement*', to monitor and control the activity of foreign fishing vessels, thus making it more difficult to introduce IUU products in the market.[40] China has not signed it yet.

We can conclude that with regard to the adoption of international agreements China is making constant but slow progress. China appears opposed to any changes on IUU rules.[41] Moreover, it is usually hard to know the actual intentions of China in relation to the adoption of international agreements. A stakeholder interviewed explained that, for instance, whilst other countries such as Japan have not signed the Port State Measures either, the Japanese authorities have at least expressed their will to ratify the measure once they overcome some domestic obstacles.[42] However, there is no indication with regard to the actual position of China.[43]

7.1.2 The role and relationship of China with RFMOs

The EC (www.ec.europa.eu/fisheries) defines RFMOs as '*international organisations formed by countries with fishing interests in an area. Some of them manage all the fish stocks found in a specific area, while others focus on particular highly-migratory species, notably tuna, throughout vast geographical areas*'.

China is member of all the so-called tuna RFMOs, which manage fisheries in approximately 91% of the world's oceans[44]. These organisations include the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Indian Ocean Tuna Commission (IOTC), the Western and Central Pacific Fisheries Commission (WCPFC), and the Inter-American Tropical Tuna Commission (IATTC). China also has a minor participation in the Conservation of Southern Bluefin Tuna (CCSBT) through an Extended Commission that provides for the participation of the Fishing Entity of Taiwan Province of China. However, China shows a lesser presence in non-tuna related organisations, given the lack of commercial interest in those regions, as explained by stakeholders consulted. Most stakeholders agree that China's attitude and participation in the RFMOs has improved in recent years. It is worth noting, for instance, the view of stakeholders such as the Long Distance Fleet Regional Advisory Council (LDRAC) or the Spanish association of purse seine

[39] Mallory (2012) explains that China scored more poorly on measures of illegal, unreported, and unregulated (IUU) fishing and so-called flags of convenience, when ships are registered in countries other than those where they are owned in order to evade regulation—important indicators for international fishing—than it did on domestic measures. On flags of convenience, China ranked 46 out of 53, with a failing score, but higher than the other major DWF nations/entities of Japan, Russia, South Korea, Spain, Taiwan. Note, the term flag of convenience describes the business practice of registering a merchant ship in a sovereign state different from that of the ship's owners, and flying that state's civil ensign on the ship. Ships are registered under flags of convenience to reduce operating costs or avoid the regulations of the owner's country.

[40] The International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing was adopted on 23 June 2001, http://www.fao.org/docrep/003/y1224e/y1224e00.htm.

[41] It is worth noting that China has not signed the Port State Measures Agreement despite similar measures having already been adopted by the Indian Ocean Tuna Commission (IOTC) of which China is member. See IOTC, 2011, IOTC Circular 2011/35 Subject: Implementation of IOTC Port State Measures resolution, http://www.iotc.org/files/circulars/2011/35-11[E].pdf.

[42] As of 11 March 2012, only 23 countries have signed the Agreement (http://www.fao.org/Legal/treaties/037s-e.htm)

[43] DG MARE echoes Japan's explanation of Japanese domestic legislation being in conflict with some of the measures from the 'Port State Measures'.

[44] See www.pewenvironment.org; see also www.seaaroundus.org/rfmo/ for details on RFMO coverage and performance.

fishing companies operating in the Indian, Atlantic and Pacific oceans (OPAGAC) who argue that China regards the RFMOs as the gateway for its commercial interests, e.g. the place where to discuss the total allowable catches. This may help explain why, on the one hand, China has not ratified some important international agreements (see section 7.1.1) but, on the other, is member of all tuna RFMOs. Indeed, stakeholders recognise an improvement of the quality of the scientific data provided by China to RFMOs in the recent years.

While some authors (Mallory, 2012) depict China as an active member that has demonstrated, overall, a record of cooperation, others (DG MARE) recognise the progress but also mention that China is not very active in leading initiatives, and even playing a passive and reactive role in some circumstances.[45]

DG MARE believes that China's "passive" attitude is partly due to a historical lack of resources – but not capacity – and partly to the fact that China is usually satisfied with the current regulatory framework. In this sense, for instance, China often rejects EU initiatives for the protection of marine species such as sharks, turtles, sea mammals, sea birds and generally to avoid by-catch, whose captures, according to DG MARE, is putting the balance of marine ecosystems at risk. In most cases this is directly linked to China's culinary culture (e.g. shark fin soup). In any case, DG MARE indicates some progress in terms of higher level of cooperation with EU initiatives. For example, the Asian block formed by China and other players, to defend surface longliner fishing interests, is responding reasonably well to the initiatives led by the EU, according to OPAGAC.[46]

In addition to the above, stakeholder feedback indicates the following areas of concern with regard to China and RFMOs:

- The growing difficulty of negotiating fishing quotas within RFMOs. This is due to the fact that China is constantly increasing its fishing capacity and thus increasing pressure on stocks. "*China wants more and more despite being already the world power in fishing";*[47]
- China automatically blocks any negotiation in which Taiwan is present and this has a direct impact on the efficiency of RFMOs. DG MARE believes that this is not a very pragmatic approach: "*we (EC) respect China's views on Taiwan but at the same time we need to accommodate to the reality of Taiwan in the fisheries world".*[48] This view is also shared by the LDRAC who emphasise the importance of having Taiwan on board: "*if Taiwan is not involved, RFMOs will miss substantial key data from one of the main players in the Indic and Western Central Pacific, which will result in difficulties to regulate fisheries activities in these regions"*. Furthermore, OPAGAC explains that concerns over Taiwan's IUU activities constitute another important reason to have Taiwan included.

[45] DG MARE explains that the relationship of China with the other members of the RFMOs nowadays is good and much better than it was twenty years ago.

[46] Other players include Japan, Taiwan, and Korea.

[47] Quote from a staff of DG MARE

[48] Stakeholders' feedback indicates that, nowadays, the China vs. Taiwan issue is only affecting one RFMO, i.e., the IOTC. The difficulties come from the legal link between FAO and IOTC (Taiwan is not member of FAO), with the participation of Taiwan as full member. Whilst most members - including Chinese technical officers - recognise the need to overcome this 'administrative barrier' and include Taiwan in IOTC, they always face the opposition of Chinese authorities who regard this as an issue of domestic policy. The result is that Taiwan's presence usually depends on China's decision, and in most cases Taiwan participates in an individual capacity as consultant or expert (e.g., the Rule XIII.9. reads "*The Commission may invite consultants or experts, in their individual capacity, to attend the meetings or participate in the work of the Commission as well as the Scientific Committee and the other subsidiary bodies of the Commission: Taiwan, China*". See IOTC Circular 2012–11 Subject: Participation by observers to the sixteenth session of the Indian Ocean Tuna Commission (S16), 2 February 2012, http://www.iotc.org/files/circulars/2012/11-12[E+F].pdf). DG MARE explains that similar situations happen in any other RFMO in which both China and Taiwan have some interest.

7.2 Activities of Chinese fishing fleets in third country waters: governmental and non-governmental fisheries agreements

7.2.1 Nature of agreements

China counts with the largest distant-water fleet in the world and is present in some 79 countries by means of fisheries agreements with third countries (see list of international agreements in Annex II).[49] The nature of these agreements varies from one country to another. Whilst some authors such as Mallory (2012) mention state-to-state bilateral agreements, others indicate non-governmental arrangements. For example, the Swedish Society for Nature and Conservation (2009), refers to agreements between associations of companies, and Walmsley *et al*. (2007) refers to "*agreements between governments and public sector / parastatal / public-private partnerships"*, e.g. the historical agreements between Mauritania and foreign state-owned companies.

In any case, China's fisheries agreements are characterised by a lack of transparency and, quite often, controversial content: *"agreements are not in the public domain, and it is very hard to know the conditions under which the agreements are signed and how far-reaching they are" (*Swedish Society for Nature and Conservation, 2009). In this sense, TransparentSea, an initiative to promote access to information and accountability in marine fisheries, criticises the agreement signed in June 2011 between the Government of Mauritania and China's state fishing company – Poly Hon Don Fisheries.[50]

Other stakeholders such as the Spanish association of purse seine fishing companies operating in the Indian, Atlantic and Pacific oceans (OPAGAC) remark that the subsidising of Chinese enterprises is one of the "big unknowns" despite being a key factor in the whole scenario.

Some stakeholders point out that whilst EU fisheries agreements seek a double objective (commercial, but also contribution to the sustainability of the local fisheries), in the case of China, the agreements are mainly commercially driven. Furthermore, LDRAC adds that in some cases these agreements do not comply with the local regulation related to fisheries sustainability (e.g. fisheries agreement between a Chinese enterprise and the Government of Mauritania).

7.2.2 Main geographical areas of concern

It is difficult to provide comprehensive information on fisheries agreements and geographical areas of activity of China's activities: "*exact details of China's distant water fishing industry in Africa are hard to come by due to a lack of publicly available information"* (Mallory, 2012). Yet, in section 2.3 we mention that we could document the presence of Chinese vessels in the Exclusive Economic Zones of 79 maritime countries and/or their overseas territories, and in Antarctica (Figure 2.1).

Our findings indicate that the presence of the Chinese distant-water fleet in West Africa is the main area of concern for stakeholders. Mallory (2012) reports on the weight of China in

[49] The term 'third country' is understood in this study as the country in which China undertakes any fishing activity, either through fisheries agreement or by other means.

[50] "Last year [2011] the Mauritanian government signed a controversial fisheries agreement with a Chinese state fishing company – Poly Hon Don Fisheries. The agreement allows up to 50 Chinese boats access to Mauritania's waters for the next 25 years, with seemingly poor regulations to limit fishing intensity. In return the company has committed to investing 100 million dollars in Mauritania's fishing sector". Source: www.transparentsea.co

West African countries, catching an estimated 190,000 tons valued at RMB 1.9 billion (€200 million in 2009). In Liberia, China is the largest foreign fishing country. In Senegal, in 2005, 63% of ocean products are exports to China. Moreover, in Senegal, the importance of China's foreign direct investment is significant, e.g. the state-owned China National Fisheries Corporation, through its subsidiary Senegal Pêche, is the largest commercial fishing player, with 12 vessels.

It is also worth noting China's expansion to South American waters by means of fisheries agreements and acquisition of local enterprises to increase the catch quota. For example, in 2010, China Fishery Group Limited acquired the entire share capital of Deep Sea Fishing, a Peruvian fishing company. According to information published in www.thefishsite.com (March 2012), this allowed the Chinese company to increase its quota or Peruvian anchoveta from 4.85% and 7.11% in the North and South of Peru to 5.08% and 7.87% respectively (Peruvian anchoveta is later imported into China as fishmeal for the farming of shrimp and carnivorous fish).

7.2.3 Socioeconomic and environmental impact on the third country

China's presence in West Africa, South America and other areas is raising growing concern amongst local and international NGOs, who are worried about the impact that these activities may have on the local economy (i.e. decline of a vital resource) and on the environment of the host country. Based on the review of several studies, Mallory (2012) mentions, in reference to China, that "*fisheries access agreements on the whole have led to unsustainable use of fisheries resources and have negatively impacted the socioeconomic development of host countries".*[51]

The fishing industry accounts for 10% of employment in some African countries such as Ghana, Sierra Leone, and Cape Verde, and 17% in Senegal. However, SMEs and artisanal fisheries complain of having fewer resources available in their waters, foreigners destroying the gear of locals, and an unequal fight against wealthier DWF enterprises. In Liberia, for instance, Mallory (2012) echoes that Chinese illegal practices are resulting in overfishing and moving out local fishermen, and in general, "*DWF has not led to increased employment, economic growth, or food security in host countries. Between 1992 and 1996, employment in the fishing sector in Ghana decreased by 20 percent because of decreased catch per boat*".

Stakeholder feedback indicates that IUU activities are probably the main cause for this scenario. As stated by Mallory (2012) "*IUU fishing poses threats to: sustainable management of fisheries resources (for example by skewing stock assessments); food security; the livelihoods of people dependent on the resource, especially in developing countries; and the broader ecosystem (for example by disregarding regulations on bycatch or gear restrictions)*".

[51] Mallory (2012) reports that "Several studies have detailed this impact, see for example Alder and Sumaila, 2004; EJF, 'Pirate Fish on your Plate - Tracking illegally-caught fish from West Africa into the European market', Environmental Justice Foundation, London, UK, 2007; EJF, 'Dirty Fish—How EU Hygiene Standards Facilitates Illegal Fishing in West Africa', Environmental Justice Foundation, London, UK, 2009; Mwikya, Stephen Mbithi, 'Fisheries Access Agreements: Trade and Development Issues', ICTSD Natural Resources, International Trade and Sustainable Development Series Issue Paper No. 2, International Centre for Trade and Sustainable Development, Geneva, Switzerland. April 2006; Standing, André, 'Corruption and Industrial Fishing in Africa', Chr. Michelsen Institute U4 Anti-Corruption Resource Centre, U4 ISSUE 2008:7; Walmsley, S.F., Barnes, C.T., Payne, I.A., Howard, C.A., 'Comparative Study of the Impact of Fisheries Partnership Agreements-Technical Report', May 2007, MRAG, CRE & NRI. 183 pages".

In fact, Mallory (2012) shows that, for instance, in Guinean waters more than half of IUU vessels identified were Chinese; in Liberia, 200 industrial vessels were observed operating despite the country having only granted 17 fishing licences; and in Liberia, Chinese vessels frequently violate the moratorium in the three-nautical-mile artisanal zone.

Moreover, IUU activities are leading to conflicts between China and its neighbouring countries, such as the recent killing of a South Korean coastguard by a Chinese fisherman who had been caught operating illegally near South Korean waters (Reuters, 2011). Our findings indicate that the situation is further complicated by the tensions and differences between local and central governments in China, and also the lack of sufficient resources pointed out in earlier sections.

In terms of impact on the local environment, the situation is likewise negative. The national representative for artisanal fisheries in Mauritania, Sid 'Ahmed Sidi Mohamed Abeid, stated in a recent report of the Swedish Society for Nature Conservation (2009) that "*the foreign boats from the EU, and also from Russia and China, use bottom trawls, destroying the habitat [in Mauritania] and our cages too*".[52] This is confirmed by Mallory (2012) who mentions that "*in Africa, DWF has depleted fisheries resources through overfishing, misreported catches and landings, fishing in illegal areas (such as in artisanal zones or in the waters of other countries), transshipped catch at sea, or using inappropriate methods or gear (e.g., trawling or illegal mesh sizes)*".

7.2.4 The *agreement-dependency* as an obstacle in the fight against IUU

Most of the aforementioned problems (social, economic, environmental) are related to the difficulties of the host country to fight against IUU activities. According to Standing (2008) this is explained by the fact that fisheries agreements are usually linked to further loans and aid projects to the third country and hence fostering dependency. The author reports the following situations:

- "*In Mozambique the sense that non-existent law enforcement against illegal fishing and logging carried out by Chinese nationals may be explained by China's growing economic importance in the country. In this context, the likelihood of a successful prosecution of a Chinese company is thought to be extremely low*";
- "*Chinese boats operating under access agreements in Guinea are apparently exempt from this rule [transhipping fish catches at se] and are free to off-load fish catches in foreign ports or onto other ships at sea*";
- "*In the Philippines, the country director of the World Wildlife Fund (WWF), interviewed in the Manila Times, claimed that over the past decade some 600 Chinese nationals have been arrested for poaching, but only one successful prosecution had occurred by 2007*".

Furthermore, stakeholder feedback points to fisheries agreements between 'non-equal parties'. In fact, Walmsley *et al*. (2007) indicate that fisheries agreements limit the contracting state's freedom of action, and Mallory (2012) mentions that "*these agreements [China and a third country] may foster dependency on the fishing nation for income from fishing fees—in Mauritania, fishing fees account for 27 percent of the state budget*".

[52] Sid 'Ahmed Sidi Mohamed Abeid is Chairman of PAN, Pêcheurs Artisanaux Nord (a national representative for artisanal fisheries) and also chairman of the Regional Permanent Forum of Artisanal Fisheries Professional Actors in West Africa

The lack of transparency plays an important role in this scenario of *agreement-dependency*.[53] In a recent article published in *The Economist* (Feb. 2012) a researcher on fisheries agreements in Africa states that "*in many cases [it] is not clear how much money [referring to EU, China and Russian fleet in African waters] is being paid for licences, or to whom*".

In this scenario, the role of donors is also very important. TransparentSea, currently working on a study on aid transparency and accountability in marine fisheries and conservation, indicates the existence of "*strong links between aid spending and fisheries access [in Africa]; several aid agencies use aid spending to improve the terms of fisheries agreements for their national fishing industry" (*transparentsea.co/2011/08/04/new-study-on-aid-transparency-and-accountability-in-marine-fisheries-and-conservation). In addition to this, Mallory (2012) mentions that '*some host countries may be afraid of cracking down on illegal fishing because it may jeopardize other development aid projects contributed by the fishing nation*'.

7.2.5 Effects of China's fisheries agreements for the EU

A final element of analysis looks at what China is actually offering in exchange to the host country and to what extent this may affect EU policies and agreements with third countries.

Most stakeholders consulted have noted concern over the way China reaches fisheries agreements with other countries. In this sense, China usually offers the host country whatever is demanded in order to secure its supply of fisheries, regardless of the adequacy to the actual needs and context of the country, and once again, without much transparency: "*here and there we see infrastructures being built with the support of China, and we say these may be part of the access agreements, but we know nothing about the contents of these agreements*" (The Head of the Artisanal Fisheries Council of Senegal, Standing, 2008).

Moreover, stakeholder feedback indicates that China's approach to fisheries agreements, particularly in Western Africa, is resulting in tougher difficulties for the EU when it comes to negotiate the agreement conditions with the host country. As it was explained, the third countries are well aware now that if the EU conditions are too demanding for them, they can always secure an 'easier' deal with China.

[53] Whilst fisheries agreements signed by China are yet far from being fully transparent, DG MARE explained during an interview for this study that there is some progress. For example, a year ago DG MARE requested information from China in relation to the country's international fisheries agreements, and, unlike in the past, '*at least they gave us some information, what was unthinkable some years ago*.'

8 CONCLUSIONS

KEY CONCLUSIONS

- The problem of massive catch over-reporting by China continues nowadays, even after China retroactively corrected the data it submitted to FAO. The point is that China does not know how much its fisheries catch.
- The flip side of China's domestic over-reporting problem is the more commonly encountered under-reporting of the catch of its distant-water fisheries. While it is in China's own long term interest to have a firm handle on its domestic fisheries, it is not necessarily in its interest for the magnitude of its distant-water catch to become visible.
- The uncertainty regarding the number of motorised fishing vessels in China (estimates range of 200,000-300,000 vessels) is mainly due to China's decentralised system and lack of procedures to integrate the information at national level.
- One major strategy to reduce capacity in Chinese waters has been to develop distant-water fisheries and China now has the largest fleet with 1,900 vessels operating in 2010.
- China is an important supplier of fish to the EU market, particularly whitefish fillets, and thus, the EU should ensure continuity of supplies from this source, providing that they meet food safety conditions and sustainability of the catch.
- Fish consumption has peaked in China, and any future changes in consumption are more likely to be in terms of gradual shifts in the nature of products consumed. Thus, the risk of major impacts on EU supplies is regarded as remote.
- Whilst China's participation in international fishery organisations and cooperation in the framework of international instruments has improved over the last few years, China's fisheries agreements are still characterized by lack of transparency.
- The EU faces increasing difficulties to negotiate fisheries agreements with third countries that have the 'easier' option of China in case the EU conditions are considered too demanding.
- Activities and catches of the Chinese distant-water fleets are almost completely undocumented and unreported, and often, may actually be illegal, thus spanning the entire gamut of IUU fishing.

This section presents our main findings and conclusions (8.1) regarding the subjects covered in this study, i.e the scale of Chinese catches (8.1.1), the state of the Chinese fleet (8.1.2), the role of China as in import / export country of fish products (8.1.3), China and the international agreements (8.1.4), and China and IUU fishing (8.1.5). Furthermore, this section presents some recommendations for the EP (8.2).

8.1 Conclusions

8.1.1 Catches

Recently, Pauly and Froese (2012) noted that "[a]lthough it might have been known to some FAO staff, the massive catch over-reporting by China documented in Watson and Pauly (2001) was not previously known to the majority of fisheries scientists at the dawn of

the 21st century. This was implicitly acknowledged by FAO (2011, p. 3), when they stated that '*there are increasing indications that capture fishery and aquaculture production statistics for China may be too high as suggested by several academic studies*, *and that this problem has become more pronounced since the early 1990s. Because of its production statistics, China is usually discussed separately from the rest of the world, as in the previous edition of this document'.* However, the problem continues ten years hence, even after China retroactively corrected the data it submitted to FAO. Thus, *'[w]hile revisions varied according to species, area and sector, the overall result was a downward correction by 13.5 percent. FAO subsequently estimated revisions for its historical statistics for China for 1997-2005*'. But the point here is that China does not know how much its fisheries catch, which appears to be similar for other key production statistics" (Thurow, 2007; Bason, 2010).

We note that over a decade after the massive extent of its domestic over-reporting was exposed, the Chinese authorities are still playing games, i.e., they have recently submitted to FAO a 13.5% modification of their alleged total catch, as if it mattered given that this catch was *decreed* by their Central Government since 1998.

The flip side of China's domestic over-reporting problem is the more commonly encountered under-reporting of the catch of its distant-water fisheries, a problem also occurring with some European countries with distant-water fleets. Here again, however, the scale is important. Moreover, while it is in its own long term interest to have a firm handle on its domestic fisheries, it is not necessarily in China's interest for the magnitude of its distant-water catch to become visible, and hence the following recommendations.

Our overall conclusion is that while the surprising extent of the over-reporting of the marine fisheries catches by China is particular to the peculiar political system of that country, the under-reporting of the catches of its distant-water fleet is not surprising, nor really unexpected.

It is not surprising because fisheries in general, and distant-water fisheries in particular, operate far away from their home countries. Thus, they have few incentives to respect the letter, let alone the spirit of the few laws meant to regulate their activities. This may apply even more so to fleets that fish under flags-of-convenience. Chinese fleets should be no exception to this. China's government, indeed, has difficulties even ensuring the integrity of the milk formula destined for Chinese babies. The behaviour of China's distant-water fleet is thus not surprising.

The very large volume of the Chinese IUU catches from the EEZs of other countries, especially of countries in West Africa, seems surprising at first. However, it is not, when one considers that the Chinese fleets operate in almost all countries of the tropics and subtropics except for the Caribbean, in an organized fashion, and not subjected to the vagaries of western- style short-term decision making.

In a sense, our catch estimates are a surprise only because this is the first time that the Chinese distant-water fleets were assessed on a global basis. With time, when our preliminary estimates have sunk in, and improved estimates become available, we will perhaps appreciate that China's rise to the first rank of distant-water fishing countries was to be expected. Equally expected has to be its coordinated mode of operation, which builds on earlier experiences (e.g. by Japan and the now defunct Soviet Union). China is now part of the new fisheries landscape - or better "seascape", and hence some of our recommendations deal with the necessity to better track the development of China's distant-water fleets, which is but one aspect of its giant economy.

8.1.2 Fleet

In 2007, China reported to the FAO a total of 289,000 motorised fishing vessels active in marine fisheries and a total combined power of 14.7 million kW. However, fleet estimates appear to be uncertain and it is more appropriate to refer to a possible range of 200,000-300,000 vessels, which is a conservative estimate. One major factor contributing to this uncertainty is the highly de-centralised system for the registration of fishing vessels and what appears to be the lack of procedures for integrating the information at national level with the necessary detail.

China dominates global fisheries, accounting for roughly 50% in terms of tonnage and a third in terms of vessel numbers. Fleet capacity reduction strategies have had only limited success and excess fishing capacity continues to be a major impediment to the effective management of marine resources in China, generally suffering from over-exploitation. One major strategy to reduce capacity in Chinese waters has been to develop distant-water fisheries and China now has the largest fleet with 1,900 vessels operating in 2010.

More detailed data are needed to assess fleet structure, fishing capacity and its management in China. Only in this way will it be possible to see if strategic goals are met and whether vessel de-commissioning schemes are having an effect. The recent implementation (in 2009) of automatically assigned vessels numbers for registration purposes is an opportunity to revise the existing information and to integrate the available information at national level. Detailed vessel information is available, at least at local or regional level, so it is a matter of integrating and making the information accessible.

In relation to distant-water fisheries, China now has the largest distant-water fleet in the world, operating over vast areas such as in the EEZs of numerous countries and in the high seas. China should provide much more detail on these fleets, including vessel characteristics and fishing activity. This would be in line with international efforts to manage fisheries and deter IUU fishing, a process in which China participates actively.

8.1.3 Trade

As it is with many other commodities, China is a major player in the global market for fishery products. China is an important supplier of fish to the EU market, particularly whitefish fillets (originating from US and Russian Pacific fleets). The EU imported €1.5 billion worth of fishery products from China in 2010, about 6% of all fish consumed. However, China contributed some 54% of Alaska Pollack, and 25% of all whitefish fillets, products used extensively by North European secondary processors, who can be regarded as highly dependent on this source of supply. Southern EU nations import a wider range of fishery products from China, including molluscs, crustaceans and salted whitefish and are therefore less dependent on this source. Given this dependency on imports of fish from China, it is in the interests of the EU to ensure continuity of supplies from this source, providing that they meet conditions regarding food safety and sustainability of the catch.

Concerns have been expressed that as China's consumers become more wealthy, they could consume more fish and that this could impact on EU supplies. Disruption of supply chain could result in increasing fishing pressure on other sources of supply to the EU market (such as Iceland, Barents Sea and EU waters), with potential negative impacts on stocks. However, there is evidence to suggest that fish consumption has peaked in China, and that any future changes in consumption are more likely to be in terms of gradual shifts in the nature of products consumed (for example more convenient products bought from supermarkets). The risk of major impacts on EU supplies is therefore regarded as remote.

Since in 2010 China imported fish worth only €213 million from the EU, the Chinese market could even present new export opportunities for EU fishery business operators. It is therefore in the interest of the EU to ensure that mutual market access conditions are maintained.

However, these interests must be conditioned by guarantees regarding the sustainability and food safety of the supply chain for Chinese fishery products. There are concerns that some of the stocks supplying whitefish (Alaskan Pollack and Pacific cod) may not be exploited sustainably. There are concerns that poor traceability and China's policy on definition of originating products (which does not reflect the flag of the catching vessel) could result in transmission of fish caught from unsustainable, or even IUU, fisheries. There is a need for significant improvements in traceability conditions applied in the Chinese sector, along with greater regulatory oversight of their application to ensure that they are applied correctly.

Similarly, whilst there is evidence from recent FVO reports that China has considerably improved the food safety conditions in the fishery sector (especially in relation to controls on residues in aquaculture products), RASFF data from DG SANCO shows that there is a significant level of intentional use of illegal substances and additives in foods from China. The FVO has also expressed concerns in relation to bivalve molluscs and ensuring fish supplies are derived from authorised freezer vessels (including those flagged by other third countries – indicating once again the need for improved traceability). The number and frequency of recent food scandals in China show that there are systemic failures still to be addressed, and that the EU authorities therefore need to remain vigilant. It is in the interests of the EU to ensure that the EU-China Trade Project, and other activities under the EU's Memorandum of Understanding with China on Sanitary and Phytosanitary matters, focus on these specific issues of concern, thus providing for the future sustainability of fishery trade between these important partners.

8.1.4 International agreements

China is portrayed as an active member in many international fishery related organisations, and overall, it has improved and demonstrated a good level of cooperation in the framework of existing international instruments over the last few years. However some challenges still remain, e.g. China's frequent opposition to any changes on IUU rules, or the increasing difficulties to negotiate quotas given China's growing fishing capacity. Furthermore some stakeholders indicate that China's recent collaboration with international organisations (e.g. RFMOs) is mainly driven by commercial interest. In this sense it is worth noting the view of a staff member of DG TRADE, who explained that for China, opening to the world is still an internal question being discussed, and that, in any case, China's priority nowadays is to feed their own people.

If there is one aspect of China's international fisheries activity on which there is unanimity, this is the lack of transparency of China's fisheries agreements, the nature of which may vary from state-to-state bilateral agreements to non-governmental arrangements between parastatal / public-private partnerships and the third country. Moreover, China's fisheries activities in third country waters - particularly in the West African coast - are quite often linked to IUU practices and considered to have a negative impact on the local economy and environment. The EU should continue leading by example in the transparency of the EU's fisheries agreements so to encourage China and others do the same.

There is growing concern amongst stakeholders, in particular those from the EU, with regards to the way in which China concludes fisheries agreements with third countries and

the subsequent consequences. It is said that, as it happens with other trade goods, China usually offers the host country whatever is demanded in order to secure its supply of fisheries. This offer can include export credits, aid programmes, financing for the country, etc. regardless of the actual needs of the host country. The consequences of this for the EU are increasing difficulties to negotiate fisheries agreements with these countries that now count on the possibility to secure an easy deal which China in case they consider the EU conditions too demanding.

8.1.5 IUU

Activities and catches of the Chinese distant-water fleets are almost completely undocumented and unreported, and often, may actually be illegal, thus spanning the entire gamut of IUU fishing. A first-order estimate of potential IUU catches around the Africa region shows around 2.5 million tonnes per year, of the estimated Chinese distant water catch of about 3.1 million tonnes per year in the African region, may be unreported.

There are numerous smaller Chinese longliners (those that do not fall under the competence of tuna RFMOs) that are quite often implicated in IUU fishing, particularly in the Southeast Asia area. Furthermore, the existing tools do not provide sufficient information to identify and track IUU-listed vessels (Kistowski et al., 2010). The Lloyd's database (http://www.lrfairplay.com/) of vessels, for instance, does not provide a complete coverage for Chinese vessels and the observed data appears to contradict the data reported to FAO by China (World Bank and FAO, 2009).

China's IUU practices have a negative effect on the local economy, society, and environment of the concerned third country. Most of the findings obtained point to China's IUU activities in the Western Africa coast. This could be correlated to the limited governance capacity of the affected countries (Agnew *et al.*, 2009), with organisations for high seas fisheries governance performing poorly (Cullis-Suzuki and Pauly, 2010) and with limited capacity to collect information on IUU activities. Furthermore, it is not unusual that fishery agreements are linked to subsequent loans and aid projects for the third country, hence fostering dependency and hindering the fight against IUU activities (Standing, 2008).

While making slow but constant progress with regard to the adoption of international agreements, China is often, at least initially, opposed to any changes related to IUU rules. However, China has already taken some initial steps to comply with the EU's IUU requirements by notifying its competent authority (i.e. the Bureau of Fisheries, Ministry of Agriculture) to the European Commission. Further follow-up is needed to the EP's recommendation to strengthen cooperation with China (EP, 2011), a view shared by most stakeholders consulted. In this sense, DG MARE expects to carry out specific actions with China in 2013 with the aim of developing EU-China cooperation in the framework of the EU IUU's Regulation.

8.2 Recommendations

1. The European Parliament should, via the proper channels, encourage FAO to insist on proper reporting of its catches from China, both domestic and distant-water, and if required, promote funding of FAO so they can hire staff who would work with Chinese officials on injecting some realism in Chinese fisheries statistics.

2. Because item (1) is not likely to be achieved quickly, if at all, the European Parliament should encourage the creation and fund, at a European university or think tank, a unit devoted to research on China's ocean affairs, with emphasis on fisheries, staffed with

personnel who speak Mandarin and read Chinese, which would track sectoral developments, using standard econometric methods, and/or, when required, unconventional approaches, as was done here.

3. However, such studies would have to be conducted as part of broader international studies, because the practices of the Chinese distant-water fleets do not differ much from those of other countries, in East Asia and Europe that also deploy distant-water fleets, the main difference with Chinese fleets being their size. Otherwise, the necessary dialog with the Chinese authorities and with Chinese scientists would be burdened by the suspicion that China is being singled out for practices which are, unfortunately, widespread in distant-water fisheries.

4. The European Parliament should encourage all developing countries, or at least Europe's African-Caribbean-Pacific (ACP) partner countries, to realize that it is in the interest of their countries and societies to make public all existing and future agreements with China and all other distant-water fishing countries, similar to current disclosure practices of EU fishing agreements. This may encourage a more virtuous competition with terms more favourable to developing countries.

5. Encourage full disclosure about real beneficial ownership of distant-water fleets, as the present maze and complexity of re-flagged vessels, joint ventures and flag of convenience tend to obscure and mask fishing operations to the extent that tracking of real trends and policy interventions become impossible.

6. Even though we did not distinguish here illegal fishing from legal access, it would be necessary in the long run to ensure that illegal operations are being dealt with as criminal matters and not as fisheries management issues.[54] However, this applies to all countries with distant-water fleets, and not only to China.

7. Encourage Regional Fisheries Management Organisations in which both Taiwan and China are members or in whose area of responsibility either country fishes, to consider data from Taiwan, despite China insisting that the issue of Taiwan is an internal matter. The global community needs to have access to such data and knowledge, irrespective of the China/Taiwan situation.

[54] This shift in emphasis of illegal fishing as a transnational organized criminal activity has been emphasized and highlighted by the United Nations Office on Drugs and Crime (UNODC 2011) with substantial leadership by the Norwegian government

ANNEX I – ESTIMATION OF THE CATCH BY CHINESE DWF[55]

This annex shows the procedure used to estimate the catch by Chinese distant-water fleets outlined in section 2. The procedure consists essentially of 5 steps:

Step 1 - Establish the presence of Chinese vessels in the EEZs of maritime countries

While, in most cases, access agreements providing the legal background of Chinese operations in the waters of a given country could not be found, there was ample documentation on the presence of Chinese vessels, ranging from newspaper articles to websites, and from scholarly articles to academic research theses. This was ascertained via a comprehensive search of online and hardcopy literature by the authors and colleagues, using resources in Arabic, Chinese, Danish, Dutch, English, French, Italian, Japanese, Korean, Norwegian, Portuguese, Spanish, Swedish and Russian. This yielded, for the period considered here (2000-2011), over 430 sources with positive records, covering 74 countries and their overseas territories, as well as the High Sea in the Atlantic, Indian and Pacific Oceans (Figure 2.1). Although it is widely recognized that absence of evidence is not evidence of absence, we are fairly confident that if we missed countries whose EEZ hosted Chinese vessels in 2000 to 2011, these operations were limited in scope, as they left no 'shadow' in the mass media of the countries in question, nor on the website of Chinese firms or government entities.[56]

Step 2 – Establishing the number of vessels involved

In numerous cases the documents used to establish the presence of Chinese vessels in countries' EEZs or adjacent high seas areas also indicated the number of boats (or their catch and/or catch composition). Thus, using the documents that attested to the presence of Chinese vessels in a given country, and the less abundant documents which estimated their numbers and other information on the world's maritime countries (notably their nationally reported catches, see www.fao.org and www.seaaroundus.org), we conducted 'country scoring' sessions. We ran 5 such scoring sessions of several hours each, where at least 10 of the *Sea Around Us* project members (and mostly co-authors of this contribution), many of who have lived in or worked on these respective regions, reviewed the available evidence for a country, and then independently 'scored' that country in terms of the number (and type) of vessels expected to be operating in that country's or territory's EEZ using a blind scoring approach.[57] The individual estimates thus generated were averaged, and their standard deviation (st. dev.) was computed, as also required for the Monte Carlo simulations. The entire procedure was run twice, once for the period 2000 to 2005, and once for 2006-2011.

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[55] This annex is based on work performed by a team from the *Sea Around Us* Project, i.e.: Daniel Pauly, Dyhia Belhabib, William Cheung, Andrés Cisneros-Montemayor, Sarah Harper, Vicky Lam, Yinying Mai, Frederic Le Manach, Ka Man Mok, Liesbeth van der Meer, Soohyun Shon, Wilf Swartz, U. Rashid Sumaila, Reg Watson, Leilei Zhai and Dirk Zeller. Henrik Österblom from the Stockholm Resilience Centre, University of Stockholm, also contributed to this section.

[56] In cases where our team's expert opinion suggested that Chinese vessel were likely present, despite absence of evidence (e.g., Nigeria), we estimated a very conservative number of vessels, and hence a very low catch.

[57] The high number of project members involved in this estimation process (always >10; including many of the authors of 'catch reconstructions' [*sensu* Zeller *et al.,* 2007] in the region of interest), and the independence of their individual estimates prior to computing the averages was to allow for the 'wisdom of crowd' effect to work, i.e., the ability for a large number of informed estimates to converge to the correct values, as they will do when they are truly independent (see Surowiecki (2004) for a detailed account, Galton (1907) for the first well documented case, and Herzog and Hertwig (2009) for recent methodological improvements). The approach is closely related to the 'Delphi method' (Linstone and Turoff, 1975), which, from rather shady beginnings (Dalkey and Helmer, 1951), graduated to a method ideally suited for fisheries research (Zuboy, 1981), in which it has been frequently applied for estimating fisheries catches (see e.g., Miller and Davidson, 1984; Pauly, 1986), or various biological parameters of fish (see, e.g. Barrett, 2009).

Step 3 – Estimating annual catch per vessel type

The annual catch per vessel type was derived, along with its confidence interval, from the data assembled by Lam *et al.* (2011) for their study of fishing costs of global fishing fleets. Specifically, the data available for 5 types of gear/boat combinations (miscellaneous gear vessels [including gillnetters, non-tuna longliners, squid jiggers etc.], bottom trawlers, non-tuna purse seiners, tuna purse seiners and tuna longliners) were assembled and analysed, yielding 5 distributions of mean annual catch (Table A.I.1; Figure A.I.1). Also, the mean ex-vessel price (€/t) and its likely range was estimated from the ex-vessel price database documented in Sumaila *et al.* (2007) and the average catch composition of the above 5 gear/vessel type combinations (Table AI.1).

Table A.I.0.1: Fishing vessel statistics used for estimating the catch of Chinese distant-water fisheries. Prices are in 2005 real value.

Gear/boat type	Catch per vessel (t/year)			No. of vessels	Ex-vessel price (€/t)[5]		
	Mean	Min.	Max.	N	Mean	Min.	Max.
Miscellaneous gear boats[1]	221	5	1,211	52	1,493	439	3,617
Bottom trawlers[2]	1,256	16	26,135	269	1,501	466	3,965
Purse seiners (non-tuna)[3]	6,230	14	40,500	62	915	83	2,723
Tuna longliners[4]	284	57	1,277	21	2,195	724	5,183
Tuna purse seiners[4]	4,640	30	7,762	40	2,326	697	5,913

[1] Including gillnetters, non-tuna longliners, squid jiggers etc. Targeting medium- and high-value fish (but not tuna), and squid (for squid jiggers);
[2] Targeting mainly demersal fish and bottom invertebrates, notably shrimp;
[3] Targeting mainly small to medium fish, such as sardine, herring, and mackerels;
[4] Targeting tuna, but with a large amount of by-catch, notably shark, in the case of longliners;
[5] Converted from real (2005) US$, using an IMF exchange rate for 2005 (http://www.imf.org; accessed 25 April 2012).

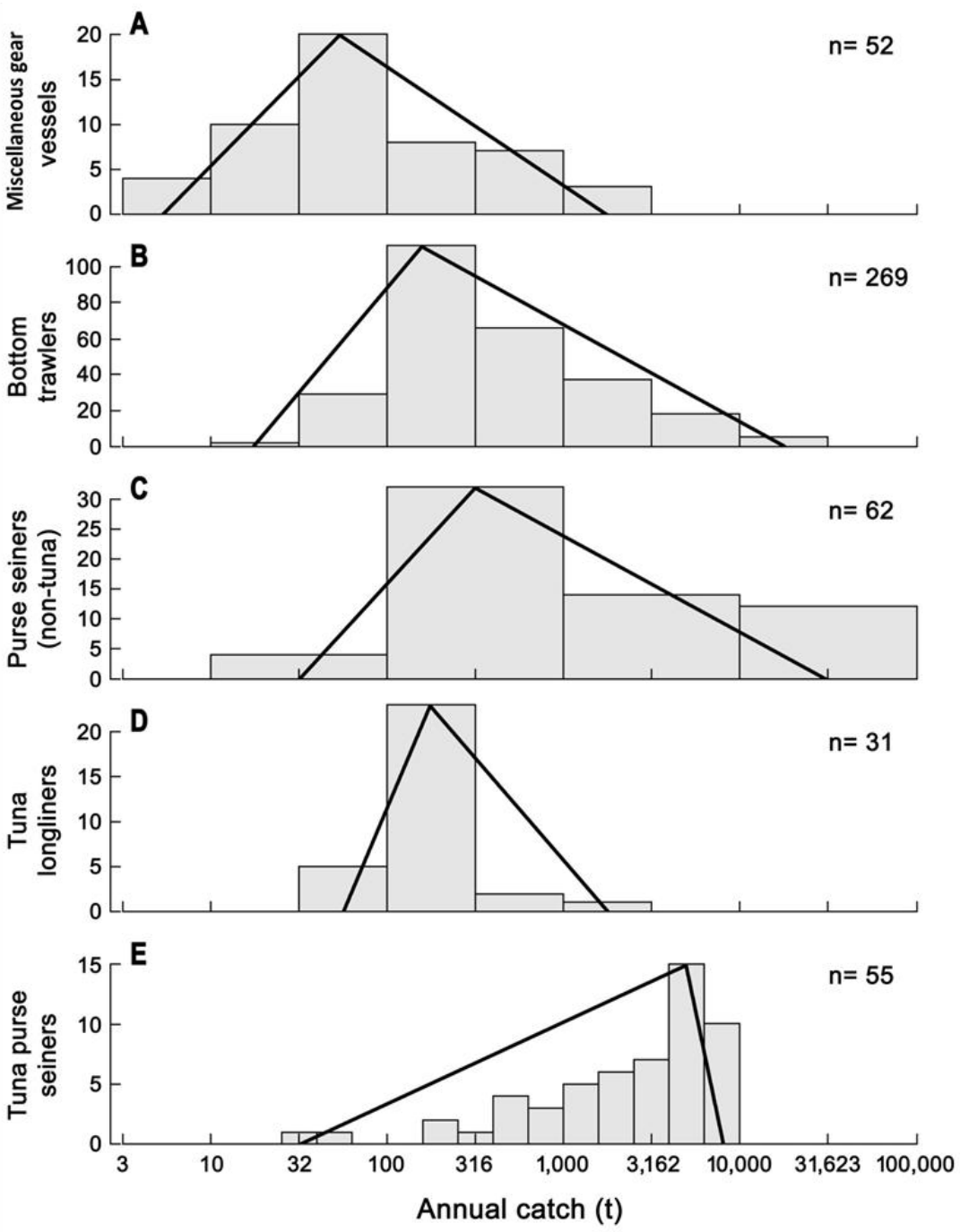
Source: *Sea Around Us* Project. Extracted from the database documented by Lam *et al.* (2011)

The distributions of the mean annual catch rates (Figure A.I.1) and ex-vessel price ranges (Table A.I.1) for each vessel type are rather wide; this is mainly because the catch and catch values of these vessels were not standardized for the size and other characteristics of the vessels. This should have a magnifying effect on the confidence intervals of the final, aggregate estimates of catch and catch value, but not on their midpoint estimates (i.e., means), at least not if they are normally distributed (as is the case here, see below).

Step 4 – Estimating Chinese distant-water catch by period and country

The annual catch of Chinese distant-water fleets, by country or territory (except Japan, and North & South Korea, see below), was estimated by multiplying the number of vessels of a given type (as obtained in Step 2) by the annual catch for that vessel type (as obtained in Step 3), by country and year, and adding up the catch of the different vessel types to regional sums. A similar procedure was applied to the catch value through multiplication of the catch tonnage taken by each gear/boat combination by the corresponding ex-vessel prices in Table A.I.2. Note that we do not deal here with discarded catches.

Figure AI.1: Distribution of annual catch (in tonnes) by the 5 gear/vessel types common in Chinese distant-water fisheries.



Note logarithmic scales, and the broad overlap of the five distributions, which tends to reduce the sensitivity of the overall results of this analysis from the country-specific assignments of vessel numbers to gear/vessel combinations. Based on vessel characteristics from multiple countries in the database assembled by Lam *et al.* (2011). The triangular distributions are those used for the Monte-Carlo simulations (see text).

Source: *Sea Around Us* Project.

Step 5 – Estimating the global catch of the Chinese distant-water fleet and its uncertainty

Following standard Monte Carlo procedures, step (4) was repeated 10,000 times, each with a different set of inputs drawn randomly from the distributions associated with the different parameters. The distribution of these 10,000 estimates was then used to calculate the standard deviation of the midpoint estimates of catch and catch values.

Due to their proximity to China, Japan and North & South Korea are known to host (legally and likely illegally) large numbers of Chinese vessels in their claimed EEZ waters. Thus, we treated these three countries separately as follows:

- For the Chinese fleet authorized to fish in the Japanese EEZ, we used the mean of the quota specified in Chinese-Japanese agreements (Japanese Fisheries Agency 2006, 2007, 2008, 2009a, 2009b, 2011, 2012) from the years for which they were available, and treated these as realized catch. We assumed that catch in the years preceding these quotas was the same as in the first year with a quota;
- For South Korea, we similarly assumed that the quotas issued by the Korean Fisheries Information Service (2012) were equal to the realized catch. We also assumed that the catch in the years preceding the issuance of these quotas were the same as in the first year with a quota; and
- For North Korea, which has only a very small EEZ on the side of its coast that faces China, we assumed that the catch by Chinese vessels is negligible. Hence, we do not mention North Korea further below.

Combined, the assumptions we made regarding the Chinese catches in Japan, South and North Korea, generated estimates (Table A.I.2) which are most likely conservative. We also assumed that Chinese vessels are not fishing in Taiwanese waters, which is why we excluded Taiwan from all further considerations.

Table A.I.0.2: Authorized number of Chinese fishing vessels and their annual quotas by gear type in Japan and South Korea from 2000 to 2011.

Year	South Korea				Japan			Total	
	N° of vessels	Annual catch (t)			N° of vessels	Annual catch (t)[1]			
		Bottom trawl	Squid jigger	Net		Bottom trawl	Squid jigger	N° of vessels	Catch
2000	*2,086*	*52,686*	*4,141*	*20,893*	*655*	*68,859*	*4,141*	*2,741*	150,720
2001	*2,086*	*52,686*	*4,141*	*20,893*	*655*	*68,859*	*4,141*	*2,741*	150,720
2002	*2,086*	*52,686*	*4,141*	*20,893*	*655*	*57,859*	*4,141*	*2,741*	139,720
2003	*2,086*	*52,686*	*4,141*	*20,893*	*655*	*49,859*	*4,141*	*2,741*	131,720
2004	*2,086*	*52,686*	*4,141*	*20,893*	*655*	*42,859*	*4,141*	*2,741*	124,720
2005	2,086	52,686	4,141	20,893	658	8,570	4,141	2,744	90,431
2006	1,968	48,402	4,141	20,449	636	8,256	4,141	2,604	85,389
2007	1,926	47,992	4,141	20,449	570	8,256	4,141	2,496	84,979
2008	1,836	46,701	4,141	19,647	508	8,000	4,141	2,344	82,630
2009	1,793	45,359	4,141	20,500	450	7,600	4,141	2,243	81,741
2010	1,686	43,357	4,141	19,991	408	6,600	4,141	2,094	74,089
2011	1,785	44,733	4,141	19,843	366	6,131	4,141	2,151	78,989
Annual mean	1,959	49,388	3,796	20,520	573	21,812	4,141	2,532	106,321

[1] For Japan, the total quota for bottom trawlers and squid jiggers combined was available for 2001-2004, and separately for 2005-2011. It was assumed that the quota for squid jiggers remained constant between 2001-2004, and adjusted the bottom trawler quota accordingly. We assumed the same catch for 2000 as for 2001.

Source: *Sea Around Us* Project. Based on Japanese Fisheries Agency (2006, 2007, 2008, 2009a, 2009b, 2011, 2012) and Korean Fisheries Information Service (2012). Values in italics are backward projections of first values in the series (see text).

High seas and Antarctica were dealt with differently than for other areas. We treated Antarctica, i.e., the area of responsibility of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR; www.ccamlr.org/ and www.seaaroundus.org/RFMO/1.aspx, see also Figure 2.2 in section 2) as if it were a 'country', with its own estimate of vessel numbers of various types, and catch and catch values. For the other high sea areas, we assumed that the vessels reported as fishing in the 'high seas' of the Atlantic, Indian and Pacific Oceans were the same ones that were reported to fish, legally or not, in the EEZs of adjacent coastal states, or their territories. This avoids potential double counting, and will tend to make our results more conservative.

ANNEX II – INTERNATIONAL AGREEMENTS

FAO country fisheries profile shows a list of international agreements of China (see Table A.II.1). In addition to this, Mallory (2012) found evidence of bilateral agreements with the following countries: South Africa (1978), Guinea-Bissau (1984), Guinea (1985), Senegal (1985), Sierra Leone (1985), and Mauritania (1991). And finally, TransparentSea reports the recent agreement (2011) between the Government of Mauritania and China's state fishing company – Poly Hon Don Fisheries.

Table A.II.1: China's international agreements reported by FAO

Date	Countries	Agreement
2010	Argentina	Agreement on fishery co-operation between the Ministry of Agriculture of the People's Republic of China and the Ministry of Agriculture and Fisheries of the Republic of Argentina
2006	El Salvador	Agreement for technical-agriculture co-operation
2000	Vietnam	Agreement on fishery co-operation in the Tonkin Gulf between the Government of the People's Republic of China and the Government of the Socialist Republic of Viet Nam
2000	Australia; Philippines; China; United States of America; Papua New Guinea; Australia; Cook Islands (New Zealand); Micronesia, Fed. States; Fiji; Kiribati; Marshall Islands; Nauru; Niue (New Zealand); Palau; Solomon Islands; Tonga; Tuvalu; Vanuatu; Samoa; New Zealand	Convention for the Conservations and Management of Highly Migratory Fish Stocks in the Western and Central Pacific
1999	Russia	Agreement between the Government of the Russian Federation and the Government of People's Republic of China on joint economic management of some islands and adjoining defined areas of water of frontier rivers
1994	Japan; Korea, Republic of; Poland; Russian Federation; United States of America; China	Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea
1994	Russia	International Agreement between the Government of the Russian Federation and the Government of People's Republic of China regarding cooperation in the sphere of protection, regulation and stock enhancement of live aquatic biodiversity in the boundary waters of the rivers of Amur and Ussuri (1994)
1990	US	Fisheries off the United States coast - Agreement between The United States of America and the People's Republic of China
Date	**Countries**	**Agreement**
1988	Australia; Bangladesh; Cambodia; China; Korea, Republic of; India; Malaysia; Myanmar; Nepal; Pakistan; Philippines; Sri Lanka; Thailand; Viet Nam; China	Agreement on the network of aquaculture centres in Asia and the Pacific

1985	US	Agreement between the Government of United States of America and the Government of People's Republic of China concerning fisheries off the coast of the United States
1984	New Zealand	Agreement between the Government of the Cook Islands and the Taiwan Deep Sea Tuna Boat Owners and Exporters Association concerning the Licensing of Fishing Vessels of the Association to Fish within the Exclusive Economic Zone of the Cook Islands

Source: www.fao.org/fishery/countrysector/FI-CP_CN/5/en (accessed on 6 June 2012)

ANNEX III – STAKEHOLDERS CONSULTED

- AIPECEE - EU Fish Processors and Traders Association, 30 March 2012
- Bilateral International Relations, Directorate General Health and Consumers, European Commission, 14 February 2012
- European Bureau for Conservation & Development, 18 April 2012
- European Federation of Food, Agriculture and Tourism Trade Unions (EFFAT), 16 January 2012
- European People's Party Group in the European Parliament
- EUROTHON - European Tropical Tuna Trade and Industry Committee, 23 March 2012
- Greens Group in the European Parliament, 22 February 2012
- LDRAC – Long Distant Fleet Regional Advisory Council, General Secretary, 2 April 2012
- OPAGAC – Organización de Productores Asociados de Grandes Atuneros Congeladores, 16 April 2012
- Unit A4, Fisheries control policy, Directorate A Policy Development and Co-ordination, Directorate General Maritime Affairs and Fisheries, European Commission, 13 April 2012
- Unit B1 International Affairs, Law of the Sea and Regional Fisheries Organisations, Directorate B International Affairs and Markets, Directorate General Maritime Affairs and Fisheries, European Commission, 2 March 2012, 9 March 2012
- Unit B4 Trade and Markets, Directorate B International Affairs and Markets, Directorate General Maritime Affairs and Fisheries, European Commission, 9 March 2012
- Unit D4 Economic Partnership Agreements 2, Directorate D Development and EPAs, Directorate General Trade, European Commission, 20 April 2012
- World Wildlife Fund - International WWF Centre for Marine Conservation, 19 January 2012

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